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Charles H. LaWall, Ph. M., Sc. D. Joseph W. England, Ph. M. J. W. Sturmer, Pharm. D.
John K. Thum, Ph. M. Arno Viehoever, Ph. D. E. Fullerton Cook, Ph. M.
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THE AMERICAN
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EDITORIAL

LYE, AMMONIA—AND LIES.

Few persons have an idea of the extent to which caustic substances are now used in the household. Years ago, about the only use for caustic soda was in home soap-making, but at present this strong alkali is much used for cleaning sinks and drains. Solutions of ammonia are also extensively employed. In consequence of this increased use many cases of poisoning, especially in children, have been occasioned and the danger is such that legislation seems to be necessary. A Federal act requiring caustic substances to be marked conspicuously by a poison label is now pending in Congress. It is meeting with considerable opposition from manufacturers, who believe that such a label will seriously restrict sales.

Dr. Chevalier Jackson of Jefferson Hospital and his associate, Dr. Clerf, have had a very extensive experience with cases of serious —frequently fatal—poisonings in children who have tasted the substances or even swallowed small portions. As might be expected, the symptoms are intense and the local action upon the mouth and adjacent tissues leads to ultimate slow starvation. Drs. Jackson and Clerf have seen many most distressing instances, and it is natural that they should be strongly interested in the control legislation.

In view of these facts, the data furnished in the January issue of the bulletin of the State Board of Health of New Hampshire, *Health,* are very opportune. Charles D. Howard, chemist to the board, has subjected to analysis a large number of samples of cleaning powders and household ammonia and has found great differences in quality and much misleading labelling. A summary of his data follows:

Sixteen samples of solid materials were tested. These all contained caustic, ranging in amounts varying from a little over 63 per cent. to nearly 100 per cent. The prices ranged from thirteen to fifty cents per can, the individual prices not by any means always

corresponding to the efficiency. Lyes for soap-making generally bear some cautionary phrase on the label, but those sold for drain cleaning are usually without warning. One of the samples consisted only of sodium acid sulphate! Small amounts of ammonia were found in a few, ultramarine in two, metallic aluminum in small fragments in one. This was presumably introduced to cause heat when the mass was mixed with water. No warning was given as to the fire risk of the evolved hydrogen. Not only are many of the preparations without cautionary labelling, but in a considerable number of cases, statements of comparative harmlessness are given. Thus, one brand that contains over 78 per cent. of caustic soda is declared not to hurt the finest fabrics and to "make the hands soft and smooth."

Household ammonias gave a still more objectionable series of results. Only in a few instances is the package labelled so as to warn against the caustic character, but as an abatement of this it is to be said that a notable proportion of the samples contain so little of the alkali as to be practically free from danger. Thirty-six samples were examined, and the ammonia content was found to range from over 10 per cent. to less than 1 per cent. One sample which was called "powdered ammonia" contained 1.07 per cent. of ammonia in the form of sulphate and chloride mixed with sodium carbonate and sodium acid carbonate. Another sample claimed to be of more use than ordinary ammonia on account of containing borax, but the amount of borax was 0.04 per cent. Prices, of course, ranged widely and individual prices bore no constant relation to the ammonia content. Thus a sample that contained 10.37 per cent. of ammonia sold for twenty cents and one containing 0.61 per cent. for ten cents.

The New Hampshire Board deserves credit for the initiation of this comprehensive investigation and Mr. Howard, the chemist who carried out the work, has made a thorough and exact collection of important data. It is to be hoped that the control legislation will not be long delayed and that among other points the qualitative and quantitative data in regard to each brand will be required on the label together with a distinct caution as to the poisonous nature of the caustic contents.

HENRY LEFFMANN.

ORIGINAL ARTICLES

THE PHARMACIST AS A BIOLOGICAL ENGINEER*

By Arno Viehoever

THE ENGINEER is the adviser and doer. We find his work displayed in bridge building, in giant power development, in reservoir construction, in the control of chemical and other industrial plants.

What, you ask, is the task of the Biological Engineer or the Welfare Engineer? Biology is the great domain of life—general welfare a dominating phase! The biological instinct is more and more directing our thought, our viewpoints, our resolutions, our actions. This is truly the biological age and, whether we will or not, we begin to realize that biology is moulding our lives—is governing the nature of all living things. Much work, however, must be constantly done to assure man and his world of the benefits of Biological or Welfare Engineering. The prevention of disease is one of the paramount aims; the prevention of waste is another important task. All people should be concerned in the solution of these problems, but the Welfare Engineer should aim to bring it about, working hand in hand with the physician and the sanitarian, who are to bring relief to the suffering and eliminate the disease.

The pharmacist—as Biological Engineer—has a real opportunity to make his service more valuable to community and state. You may want to ask, "Has he ever done much—in a large sense, for the Community Welfare, has he the training and the broad outlook to justify this activity as a welfare engineer?"

We claim that tradition, as well as the extended training now being provided in our pioneer schools, should qualify him to give such service.

A survey of conditions of Pharmacy such as that recorded by Schelenz in his book on the History of Pharmacy reveals a tendency in Europe, as far back as the middle ages, to organize privileged pharmaceutical stores and laboratories. We find them established often as a distinct consequence of plagues and note that the church,

*Elaborated from address on "Biological Engineering" given June, 1924, before the State Pharmaceutical Association at Bethlehem, Pa.

rulers of states, or the community representatives have been instrumental in bringing about their organization.

Rulers appointed their "court pharmacists" in the interest of their own health and that of their servants. Communities evidently employed pharmacists in the interest of pure medicines for the Commonwealth—as well as to have an official adviser in general questions of health and public welfare. These conditions have prevailed in a measure up to the present day in several countries—Sweden, for instance—and exist even today in some places in our own country. They have resulted in much fruitful work.

The field was by no means restricted to the art of compounding medicine. We find the activities extended to all phases of welfare engineering and shall relate a few of the outstanding accomplishments of workers who spent part or all of their active life in the practice or teaching of pharmacy. Some were "mere students" of pharmacy but retained evidently a life-long interest in the great opportunities of this calling to benefit mankind.

In this tendency we have the beginning of the Biological Engineer.

I

Civic and Sanitary Phases of Welfare Engineering

As an illustrious example of community work the activities of Parmentier (1737-1803), chief pharmacist of the "Invalides" in France, may first be recorded. He interested himself, actively, in the improvement of hygienic conditions of communal life, investigated the milk supplies for the people and was instrumental in the introduction of the potato. As a result of his fruitful work we find today a variety of potato still called "Parmentière," and a plaquette on his grave erected by the people of his time reading:

"Il aima, Il éclaira les hom̃es, mortels bénissez sa memoire"—*He loved, he elevated man, mortals bless his memory!* Surely an inspiring public tribute to a pharmacist!

One of the first independent pharmaceutical institutes was that founded in Breslau, Germany, by Goeppert (1800-1889), who acted as professor of botany and medicine, later as director of the Botanical Garden, who lectured on Pharmacology, criminal chemistry and technology, who introduced the first microphotograph and encouraged the pharmacists of his day to follow his example and act as

consulting experts in problems of natural science and general welfare.

Von Pettenkofer (1818-1901), German "court pharmacist" and professor of medical chemistry, became the pioneer worker in "Hygiene" (coining this name, I believe) and was instrumental in the organization of the German Imperial Institute for Health.

Water analysis was greatly further by the pharmacists, Ludwig (1819-1873), and especially Reichardt (1827-1891), who published books on the subject and otherwise established a reputation in food and criminal chemistry, furthering hygienic, chemical and technical problems.

In this country, similarly, pioneer pharmacists can be enumerated who greatly furthered civic biological problems. Limiting this brief survey only to members of this "Oldest American College of Pharmacy," we must mention the names of Leffmann, LaWall, Sadtler, Beringer, who in their laboratories contributed much to the solving of problems of food and general welfare. We find members of the College now engaged in federal welfare service (Mr. Hunsberger), in State and National Board of Pharmacy service (Mr. Walton), and alumni such as H. L. Meredith, formerly of Hagerstown, Maryland, and now in Florida, acting as constant advisors to their respective communities in questions of health and general welfare. We should also mention the pioneer work of G. Holstein, a member of the Town Council of Lebanon, who brought about the establishment of the first sewage disposal plant in the State of Pennsylvania, still said to be the best; and the long continued and well recognized influence of such men as W. F. Horn, of Carlisle, Pa., upon the civic thought and welfare of his fellow townsmen.

That pharmaceutically trained workers are giving constructive thought to the question of health is evident from reading the article by Prof. Gershenfeld in the November number, 1925, of this journal on Environment—The Big Factor in Health and Disease.

II

Technological Phases of Biological Engineering

Deyeaux (1745-1837), "Napolean's Pharmacist," isolated tannin as the tanning constituent of galls. Runge, pharmacist and Professor of Technology, discovered carbolic acid and anilin as products of coal distillation, coal being carbonized vegetation.

Mohr (1806-1879), a "mere pharmacist," developed his "Volumetric Analysis," a quantitative analysis procedure now generally adopted, designed the cork-borer, and a balance for specific gravity determination—and gave fruitful thought to the nature of heat and earthquakes.

Berthelot (1827-1907), Professor of Organic Chemistry at the Paris College of Pharmacy, was one of the most brilliant experimenters. He worked out several technical processes for the organic synthesis of various organic compounds found in plants.

Thoms, the director of the Pharmaceutical Institute of Berlin, Dahlem, Germany, furthered various technological processes, among them that of dialysis, using gliding membranes.

Pharmacist Braun (1877) started to distribute his anilin dyes known as "Braun" Dyes. Blumensaadt, another pharmacist, produced a widely used vegetable color for butter and cheese—and also rennet.

Samuel Gerhard, a P. C. P. alumnus of the class of 1854, devised the first porous plaster, still distributed by Allcock & Co.

Herman Frasch, who started his career as an assistant of the late Prof. Maisch or Sadtler, in this college, made possible the sulphur industries of Louisiana and Texas.

The milling of crude drugs and chemicals preceded the milling of paints and dyers' supplies. We find these and other products mentioned, over 100 years ago, by T. W. Dyott of Philadelphia among the stock in his "Wholesale and Retail Drug and Family Medicine Warehouse." Even today the largest paint supply house in Alexandria, Va., is located in a pharmacy as a long established line. The manufacture of chemicals, like phenol and other disinfectants, forerunners of plant sprays, had their origin in the laboratories of pharmacists.

Other examples might be mentioned if space permitted.

III

Plant Welfare Engineering

Agricultural Phases—Liebig, Davy, Dumas and Berthelot, to whom we shall refer again, were occupied not only with the study of the plant substance but also with agricultural chemistry, and they tried to utilize for plant growth the results of their work in chemistry.

Farmers who noted the progressive loss of fertility of their soil, in spite of rotation of crops, deep plowing and even manuring, ob-

tained help from an unexpected source. Liebig (1803-1873), who started his illustrious career at the age of fifteen in a Hessian Pharmacy, suggested the addition of salts such as phosphates and potash, now called fertilizers, to the impoverished soil. He even suggested the use of urine—containing a substance "urea," which through the most recent work of the Badische Anilinfabrik, Ludwigshafen, Germany, has been found to have marvelous effects on plant growth. Liebig is honored as the founder of the science of agricultural chemistry.

When Woehler brought the discovery of the synthesis of urea to his notice, Liebig took it up with enthusiasm and, through extensive co-operative work, the foundation of organic chemistry, so essential in present-day industrial life, was laid as well.

Fresenius (1818-1897), a pharmacist and later an assistant of Liebig's, joined a governmental agricultural institute as agricultural chemist and then organized a pharmaceutical-agricultural chemistry laboratory, still existing, in which many methods of pharmaceutical and agricultural chemistry were developed.

Arthur Meyer, Pharmacist, then Pharmacognosist, Plant Physiologist and Director of Botanical Garden, developed with his "school," to which the writer belongs, the botanical and biological study of bacteria—especially soil bacteria.

Charles Mohr, who came to this country in 1848 as a lad of twenty-four years, joined the American Pharmaceutical Association and settled in Alabama, did pioneer work in the South in connection with forest trees and their products, grasses and other forage plants, assisted the turpentine—and sugar cane industries, studied citrus—and camphor trees and fiber producing plants and contributed much general knowledge concerning the improvement of exhausted soils and betterment of agricultural practice.

Every State in this Union, Dr. Eberle kindly informs me, had pharmacists among its botanists who advanced the cultivation and utilization of plants useful for economic or food purposes and who caused the destruction of harmful and valueless plants.

Medi-cultural Phases—Pharmacists—even more than they do today—used to grow plants, especially those of medicinal value, in their own gardens. Aristotle, one of the illustrious pharmacist-biologists of old, was a road cutter and drug collector. What knowledge he had of life was, without doubt, gained through his contact

with and close observation of living plants and animals. Records also tell us of a Krakau pharmacist who established the "time factor" in the development of plant life.

Wild (1784-1849), besides working in his pharmacy and on the Hessian Pharmacopœia, established extensive gardens, recognized as one of Kassel's worthwhile sights.

Mueller (1821-1896) and Peckolt (1822-), both pharmacists, emigrated to Brazil; here the first became known as colonizer, teacher and worker in natural science. Peckolt, in turn, deserves great credit, because, through numerous publications concerning food and medicinal plants, he increased the general knowledge of South American products and their utilization.

Each country, no doubt, can count among its pharmacists such pioneers, who studied and developed through exploration in foreign lands, natural resources of medicinal products—*e. g.,* Greshoff for the Netherlands, Perrot for France, Hooker for England, Tschirch for Switzerland—Rusby for our United States.

For the development of medicinal plant gardens pharmacists and pharmaceutical firms deserve a great deal of credit. In this country we find quite a number of gardens attached to colleges of pharmacy, due in no small measure to the ready help of the Bureau of Plant Industry of the United States Department of Agriculture—Dr. Stockberger and Mr. Sievers now, and formerly Dr. True, having charge of the distribution of medicinal plants.

The following deserve special mention: This College's Botanical Gardens established through the generous support of the Mulford Biological Laboratories and under the direction of the writer and Dr. Githens, the gardens established by Prof. Newcomb in Minneapolis, that in Brookings, S. D., developed by Prof. Hogstad, that in Purdue under the care of Prof. Zufall. These are gardens I have seen personally. I should mention others of which I have heard, such as the Medicinal Gardens of Eli Lily, Indianapolis, and the golden seal cultures planted under the direction of Prof. J. Uri Lloyd, Cincinnati, as well as that of the Pharmaceutical Experiment Station at Madison, Wisconsin, in charge of the dean of the Pharmacy School, Dr. E. Kremers, one of the most interesting of all. Much suggestive engineering work has been done there. This chapter may fitly be closed with a reference to the large scale operations of Todd in growing peppermint plants for peppermint oil near Kalamazoo, Michigan, of Russel growing Japanese mint for menthol pro-

duction, on the Vick Farms, to the Digitalis culture of Upsher Smith in Michigan and to the Digitalis and Belladonna culture at our gardens in Glenolden, Pa.

IV

Nutritional Phases

Liebig not only was a pioneer in the study of the chemical needs of the fertile soil, but in the study of life as a whole. A belief prevailed in a vital force, assumed to be the active principle or agency in all forms of living things. He demonstrated that no such force existed, and that the phenomena apparently needing vital force were simply exhibitions of energy, liberated in the state of animal and vegetable heat and motion through the process of digestion and assimilation of foods. He was the first to show that the transformation of inorganic into organic material is the one duty in the world of vegetation. He showed that only by the consumption of the products of plant life—fruits, vegetables, grains, was it possible for animals to obtain foods that could be changed into tissue and necessary body fluids. Liebig thus advanced our knowledge of nutrition and metabolism, producing a proper diatetic food of outstanding commercial success. This preparation, Liebig's "Beef Extract," was first made under his direction by the Court Pharmacist, J. X. Pettenkofer, the uncle of von Pettenkofer, who was the pharmaceutically trained pioneer in hygiene. Numerous other extensive problems relating to nutrition have been solved as a result of Liebig's success.

As a further example of success achieved in the field of human nutrition, the venture of Henry Nestle (1814-) should be mentioned. After studying pharmacy in Heidelberg, he established, in Switzerland, a plant for utilizing cheap sources of milk to make his milk powders for children—"Nestle's-Kindermehl"—and later, Nestle's Condensed Milk.

Similarly, in this country, we find pharmaceutical firms such as Smith, Kline & French Company, pioneers in children's food (Eskay's), Milk sugar and other deficiency preparations, *e. g.*, calcium glycero phosphate.

The Root Beer (Hires'), so well known in this State, is also the product of a pharmacist. Cultures of lactic acid bacteria and of yeast manufactured by various pharmaceutical concerns similarly merit mention.

vaccination and smallpox in particular—a field of work which has brought untold benefit to mankind.

Pasteur, the founder of present day bacteriology, the originator of pasteurization, *i. e.,* killing the micro-organisms responsible for fermentation, produced protection against rabies and developed anthrax anti-toxin. He showed that some bacteria not existing in body temperature lose their ability to cause infection. Baumann studied intestinal infection, introduced sulphonal and trional as hypnotics. Liebig discovered chloroform, chloral and improved ether, which latter also Dumas (1800-1864) had done in connection with its use for surgical operations. In this connection it will be remembered that the physician-pharmacist Crawford W. Long, a graduate of Pennsylvania University, is credited by historians in this country with the discovery of ether as an anesthetic. Labarraque, French apothecary, established the antiseptic value of solutions of potassium and calcium hypochlorite.

Mention may also be made here of Dr. Eberle's opinion that chlorinated lime was used in Philadelphia before Labarraque's solution became known.

Liebig, through these studies applying chemistry to physiology, improved the methods of investigating medicines and thus gave the medical profession the possibility of certain diagnosis. The work on saponins and toxins by Kobert and that on Bioassays by Stewart, Vanderkleed and Pittenger, or Hatcher—the pharmacological work of Sollman, or Brown, all pharmaceutically trained, may conclude the list of workers selected at random.

Call to Action

Having discussed the records made by pharmaceutically trained leaders in welfare engineering, let us see what opportunities there are today for applications of biologic knowledge to problems of community welfare.

In *Civic and Sanitary Service* the pharmacist should co-operate with health officials in the prevention of disease and its spreading—in seeing that the Food and Drug Act is enforced, proper sanitary conditions prevail, that milk and water are pure, garbage and sewage properly disposed of, that smoke damage, forest destruction and stream pollution are kept down to a minimum.

In *Technical Service* the pharmacist should lend his aid in protection of raw and manufactured products and general prevention

of decay and waste. Lumber, leather, fabrics can be protected against mold, mildew, insects, furniture and clothes against mold—the homes against flies, insects and rodents, all potential disease carriers.

In *Agricultural Service* the pharmacist in co-operation with State and Federal Service should assist the farmer as his advisor, interpreting or making simple soil analyses in connection with the soil's need for lime, or other salts, for specific fertilizers or for specific bacteria; should aid him in his constant fight against plant disease and insect attack.

In *Nutritional Service* the pharmacist should assist in solving the food or feed problems existing in any community, should urge the elimination of worthless or harmful plants on pastures, discourage feeding of deficient foods and feeds and stimulate, where needed, the use of accessory food products, as vitamines—yeast, etc.

In *Biochemical Service* the whole emphasis should be placed on the distribution of only worth-while products, the pharmacist as judge selecting the best preparations of a given type and assuming the fullest possible responsibility.

In Medico Physiological Service the pharmacist should be equipped to distribute effective biological preparations, vaccines, sera, cultures of living organisms; he should be able to analyse water, urine, blood, sputum—and use in his preparations, wherever possible, those of chemically as well as physiologically known value.

The service enumerated is greatly facilitated through the co-operation with manufacturers, colleges, experiment stations, state and governmental institutions, with members of the medical profession and others interested in Health and Public Welfare. Charters in his Pharmacy Report (Common Wealth Fund Study) concludes: "The pharmacist is obligated to become an actively participating force in the elevation of the health index of his community. When well trained and possessed of accurate information he is of very great value as the disseminator of a wide range of miscellaneous scientific information; he is the chief source of information and materials for the control of insects, fungi and parasites, he is the best single individual to disseminate information about Public Health."

The time is ripe for the realization of a moral and a cash value from such conditions. Mindful of all his professional opportunities, the pharmacist should promote the "general welfare" line, discarding the side-lines (consequences of emergency—or uncontrolled growth—the very cancer in pharmacy). He should assume his place in the

community as the Welfare Engineer, commandeering all possible resources for the benefit of his fellow-men in need.

Yesterday belonged to the Mechanical and Chemical Engineer, but today and tomorrow belong to him, whose work we have touched upon—the Biological or Welfare Engineer.

STUDIES IN THE GENUS MENTHA [1]

VIII. On the Aldehydes of Peppermint Oil

By Roland E. Kremers [2]

THROUGH the courtesy of Mr. N. R. Mueller, chemist for the A. M. Todd Company, of Kalamazoo, Michigan, the writer was enabled to examine the aldehydes in the forerunnings of peppermint oil. It is in these fractions that the biogenetically important aldehydes are concentrated by the rectification processes which make the crude oil conform to the pharmacopœial standards.[3]

The material at hand was derived from 12,000 pounds of natural oil. It had a density of about 0.869; 10 ml. required 0.2 ml. of 0.5N KOH for neutralization; assay for aldehydes revealed a content of 6 per cent. by volume. The oil freed from aldehyde had an ester number of 8.2, which was increased to 35.1 by acetylization. A trial distillation was conducted with 300 ml. of oil, using a short Vigreux column. The temperatures were recorded for each 50 ml. of distillate except in the case of the last fraction.

Frac.	*Boiling point.*		
1. up to	158° C.		
2.	158-162		
3.	162-165		
4.	165-168		
5.	168-175		
6.	175-185	volume	25 ml.
7.	185	residue	25 ml.

[1] Contribution from the Wisconsin Pharmaceutical Experiment Station, Madison.

[2] National Research Council Fellow in Chemistry, 1922-23.

[3] Refer to *Jour. Biol. Chem.*, 50 (1922) 31.

The temperatures and volumes clearly show that the oil is comprised largely of substances coming within the distillation range of the terpenes.

The removal of the aldehydes was accomplished as follows: 55 pounds of oil were emptied into a 10-gallon carboy and stirred with an electric stirrer. Thereupon a solution of 500 g. of sodium bisulfite in 2.5 L. of water, which had been treated with a little sodium carbonate to reduce the amount of free sulfur dioxide, was gradually run in. The precipitate which formed at first was eventually redissolved. When the oil ceased to give more than a faint test with Schiff's reagent, the stirring was stopped and the sulfite liquor was allowed to settle. After its removal, the oil was agitated for one hour with 500 ml. of water. The two aqueous solutions were combined. The loss of oil due to extraction was 1.5 pounds. A second quantity of oil was similarly treated.

The combined bisulfite extracts were freed of suspended oil by thorough agitation with 500 ml. of "fractol." In order to regenerate the aldehydes, the solution containing their addition compounds was placed in a 60 L. still and treated with a solution of 750 g. of sodium carbonate in 4.5 L. of water. No oil separated on mixing, but the reaction proceeded rapidly as soon as steam was introduced. The oil was separated from the aqueous distillate and the latter redistilled once. The yields were:

1st run	460 g.
2nd run	550
Cohobation	35
Total	1045 g. or 2 lbs. 5 oz.

The oil was dried by shaking for six hours with anhydrous sodium sulfate. The freshly prepared product had a not unpleasant odor and a burning taste; it was very volatile and oxidized rapidly in contact with the air.

One liter of oil was submitted to fractional distillation through a Vigreux column. The final series revealed:

Frac.	*B. p.*	*Vol.*	*density*	*ref. ind.*	α.D
1.	-75°C.	7 ml.	.....		
2.	75-85	21	0.8027		
3.	85-88	42	0.8043		
4.	88-90	68	0.8066		+2.0°
5.	90-92	230	0.8040	1.2870	+2.1
6.	92-94	195	0.8017	1.3884	+1.8
7.	94-96	36	0.8060		+1.6
8.	96-98	30			
9.	98-00	21			
10.	100-10	43	0.8143		
11.	110-20	22			
12.	120-40	39			
13.	140+	166			
Total		920			
Loss		80			

Fractions 12 and 13 were then fractionated *in vacuo*.

Frac.	*B. p.* 22	*Vol.*	d_{25}	n_{25}	
a.	30-40°C.	32 ml.	0.8272	1.4068	+5.3°
b.	40-60	24	0.8538	1.4300	+9.5
c.	60-80	57	0.9067	1.4410	+4.5
d.	80-00	22	0.8759	1.4300	+0.75
e.	100-20	12	0.8565	1.4330	+0.0
f.	120+	58			

From these results it is evident that the compounds present are largely aliphatic. The constants of fraction 5 are in good agreement with those of methyl-3 butanal-1 (Iso valeric aldehyde).

Boiling point = 92° C.; d_{25} = 0.8089; n = 1.39488.[4]

d-Methyl-2 butanal, the presence of which is suggested by the optical activity of these fractions, is characterized by

B.p. 90-92° C.; d_{20} = 0.8068; [α] = +21.91°.[5]

[4] Semmler. Ber. 42, p. 2015.

[5] Ehrlich, F. Ber. 40, p. 2556.

Identification of Aldehyde

Although a study of the literature gave little hope that the preparation of any of the usual condensation products would enable the positive identification of any of the isomeric valeric aldehydes likely to be present in the larger fractions, two such compounds were formed. A portion of fraction 5 reacted readily with semicarbazide to give a product that appeared to be a mixture, since the melting point was at first indefinite. By recrystallization from dilute alcohol the melting point of the substance was raised to 102-03° C.

The same fraction was involved in reaction with p-nitrophenylhydrazine. By several recrystallizations from dilute alcohol the melting point of the nitrohydrazone was raised to 107-08° C.

Fraction 1 was treated with p-nitrophenlhydrazine in order to determine whether an aldehyde of less than 5 carbon atoms was present. Recrystallization of the reaction product from 70 per cent. alcohol raised the melting point to 102-03° C. The known p-nitrophenylhydrazones with a lesser number of carbon atoms have either a lower or a considerably higher melting point. Hence the lower boiling material was not appreciably different from the larger fractions. The lower boiling point was accordingly probably conditioned by the presence of some moisture not removed by the preliminary drying.

The preparation of n-pentanal-oxime was attempted from fraction 10. However, no crystalline compound was obtained, thus leaving the matter in doubt.

A less direct, but more certain, method of establishing definitely the presence of methyl-3 butanal and of methyl-2 butanal appeared to be available through the conversion of the aldehydes into their homologous amino-acids, iso-leucine and d-iso-leucine, respectively. The work of F. Ehrlich [6] has resulted in a method for the resolution of a mixture of these two acids, and the work of Zelinsky and Stadnikoff [7] has provided a method for the conversion of the aldehyde mixture into the corresponding amino-acids.

For the preparation of the amino-acids 20 g. of fraction 5 were employed. The directions of Zelinsky and Stadnikoff were followed closely, except that enough ethanol was added to bring the amino-nitrile into solution, and lead oxide was substituted for silver oxide,

[6] F. Ehrlich. Ber. 40 (1907) 2558.
[7] Zelinsky and Stadnikoff. Ber. 39 (1906) 1722.

as was done by Ehrlich, in the declorination of the amino-acid-hydrochloride. The experiments proceeded as described in the literature and were very encouraging up to the elimination of the copper from the copper salts. At this stage poor yields resulted. Moreover, the soluble fraction, which was expected to contain any d-iso-leucine present, yielded a product which did not have the expected solubilities and was inactive. Hence d-iso-leucine was not obtained and the question as to the cause of the optical activity of the aldehyde fraction remains undecided. The copper salt which was insoluble in methyl alcohol, and which was much the larger of the two fractions, gave iso-leucine as was to be expected. Melting point in a sealed tube, 281-82° C. Methyl-3 butanal (iso-valeric aldehyde) was therefore the main constituent of fraction 5.

The higher fractions, which were distilled *in vacuo* have not yielded any definitely identified substance. Fraction **e** had an odor which suggested the presence of citronellal. Attempts to obtain the naphtho-cinchoninic acid always gave the methyl derivative, indicating that such condensation as occurred took place at the expense of the pyruvic acid. With the exception of fraction **c,** the constants indicated that the material was largely aliphatic in nature. This fraction had certain resemblances to the cyclic ketones, such as methyl-cyclohexanone. The following manipulation was undertaken in order to isolate such material. Some acid formed by spontaneous oxidation was first removed by dilute alkali. Then the aliphatic aldehyde was combined with bisulfite, using sodium sulfite for this purpose and titrating the liberated sodium hydroxide with dilute hydrochloric acid with phenolphthalein as indicator. The residual oil was dried and fractionated through a small Vigreux column. The larger fraction distilled between 165 and 170° C. had an approximate density of 0.913. The semicarbazone, which was readily obtained, was a mixture. After several crystallizations from 70 and then 50 per cent. ethanol, the melting point was raised to 165-70° C. Its identification was not obtained.

In view of the statement by Curtius and Franze[8] that the aldehyde obtained by them from green leaves was always hexene-2 al-1, an attempt to identify it in fraction **b** was made. For this purpose a p-nitrophenylhydrazone was prepared according to their directions. The resultant oil could not be crystallized. Attention may be called

[8] Curtius and Franzen. Ann. 390 (1912) 89.

to the failure of Power and Chestnut to find this aldehyde in the volatile products of the cotton plant and to their assumption that it is produced only as the result of an enzymic action in bruised or ground tissue.[9]

Summary

1. The aldehydes and reactive ketones have been isolated from a large quantity of crude peppermint oil.

2. The aldehydes obtained had the physical characters of the aliphatic series and the predominating fractions were within the distilling range of the valeric group.

3. Methyl-3 butanal (iso-valeric aldehyde) was quantitatively the most important constituent and was definitely identified through conversion into iso-leucine.

4. The presence of a d-methyl-2 butanal, suggested by the optical activity of the valeric fractions, was not confirmed.

5. Neither hexene-2 al-1, nor any other compound was identified in the high boiling fractions.

SOLUTION OF MAGNESIUM CITRATE, U. S. P. X.

By J. W. England

IN VIEW of the fact that the U. S. Pharmacopœia has again increased the acidity of solution of magnesium citrate, already unduly acid, it would seem proper and timely that the subject of the acidity of this nationally-used preparation, previously discussed by the writer ("The Excessive Acidity of the Official Solution of Magnesium Citrate," by J. W. England, AMER. JOURN. PHARM., Sept. 1924, 657), be further considered.

The formula of the U. S. P. IX. is too acid to be palatable; that of the U. S. P. X. is even more so. The increased acidity has been made to ensure greater stability and prevent precipitation, but it is secured at the expense of acceptability—the solution is repugnantly acid; furthermore, the solution is stronger therapeutically than it should be.

The history of the official formula of this solution is of special interest. It was first recognized by the U. S. P. of 1850, when it

[9] Power and Chestnut. *Jour. Am. Chem. Soc.*, 47 (1925) 1751.

was made too strong in both carbonate and acid; the same mistake was continued in the U. S. P. of 1860, an equivalent amount of oxide being used in place of the carbonate.

In 1870 the proportion of carbonate and acid was reduced to 200 to 400 grains respectively, and it was the same in 1880. *This is equivalent, practically, to 13 (12.96) Gm. of carbonate and 26 (25.92) Gm. of acid.*

In 1890 a radical change was made, the carbonate was increased to 15 Gm., a 15 per cent. increase, and the acid to 30 Gm., the same percentage of increase.

In 1900 there was no change in the carbonate (15 Gm.), but the acid (30 Gm.) was increased to 33 Gm., a 10 per cent. increase.

In 1910 the 1900 change was retained in the formula, but syrup was substituted for syrup of citric acid, decreasing the acidity of 1900 by 0.6 Gm.

In the 1920 issue the carbonate is 15 Gm., but the acid is 35 Gm.!

During the past fifty years there has been an increase of from 13 Gm. of carbonate to 15 Gm., or 15 per cent., and of acid from 26 Gm. to 35 Gm., or 34 per cent.!

All three of the French Codex lemonades of citrate of magnesia, for example, "are less strongly acid than the U. S. P. solution. In each case only about two-thirds as much acid in proportion to the magnesium carbonate is used as in the U. S. P. preparation." (Bulletin 35, Sub-Committee No. 12, of Committee of Revision, December 23, 1924.)

The initial mistake was made in 1890 when the carbonate was increased from 13 Gm. to 15 Gm. (with 30 Gm. of acid) and this mistake has been continued in successive revisions with continuous increases of acid. This has made the saline solution more and more concentrated, and has required more and more acid to prevent precipitation. The solution is very near the saturation point. In addition 350 cc. of this solution is not the former 12 fluid ounces; it is only 11.835 fluid ounces or 11 fluid ounces and 400 minims, which means still greater concentration than formerly.

The soluton of the problem, the writer believes, is not in the use of more acid in the formula, but in a return to the official formula of 1870 of 13 Gm. of carbonate and 26 Gm. of acid, or rounded-off, metrically, 12.5 Gm. of the former and 25 Gm. of the latter. If a wholly acid-salt solution be found necessary, it could be had by add-

ing more acid, but even with this, the acidity would be much less than the present solution.

The undue acidity of the new formula will subject the preparation to public criticism, and it would be well for pharmacists to label their "citrate" with the statement that "If the solution is too acid to your taste, it can be reduced by slowly adding a *level* teaspoonful (or more) of sodium bicarbonate to the solution (after the bottle has been opened and effervescence has ceased) stirring after each addition."

The official solution contains over one ounce of acid magnesium citrate. The usual dose of magnesium sulphate is only one-half ounce. Physicians frequently prescribe only one-half bottle of the official solution as a dose. The reason is obvious. The official solution is too strong.

A word as to the bicarbonate used to carbonate the solution in the bottle. The Pharmacopœia for many years required the use of potassium bicarbonate only. In the new revision (as in the U. S. P. IX.) either potassium bicarbonate or sodium bicarbonate is permitted; and it is upon this latter fact that criticism may be made.

It is not generally recognized that a part—and it is no small part—of the therapeutic value of solution of magnesium citrate is due to the diuretic and diaphoretic action of its alkali citrate—that elimination is to be secured not only by purgation, but also by diuresis and diaphoresis.

Thirty-nine grains of potassium bicarbonate, used for carbonating (the official quantity), forms with citric acid about 42 grains of the official potassium citrate.

Thirty-three grains of sodium bicarbonate (the official quantity) forms with citric acid about 39 grains of the official sodium citrate.

Potassium citrate is rapidly absorbed and is a powerful diuretic. "It is decomposed in the body with the formation of carbonate and exerts an alkaline action after absorption, thus increasing the alkalinity of the blood and of the urine, and of producing free diuresis. It has, also, some diaphoretic action." (Reynold Webb Wilcox, "Materia Medica and Therapeutics," 1917, 391.)

"Potassium citrate is employed principally to increase the quantity of urine and render it alkaline in gout and rheumatism, in catarrhal conditions of the bladder and uretha and as a mild diaphoretic and februfüge in feverish conditions. It is employed in acute nephritis and in large doses in the acid intoxication of diabetes; it is a useful

expectorant in the early stages of bronchitis. Dose 15 to 60 grains." (B. P. C., 1923, 885.)

Sodium citrate resembles potassium citrate but is markedly inactive, inferior as a diuretic and diaphoretic, and superior as a purgative. "Since it is absorbed with some difficulty, it is a mild purgative, similar in action to magnesium citrate. The portion which may be absorbed will have some dieuretic effect. It may be administered where a pleasant saline laxative is required." (Reynold Webb Wilcox.) Its dose "as a laxative is 6 to 10 drachms" (N. S. D., 1916, 1498).

Therapeutically the use of potassium bicarbonate for carbonating solution of magnesium citrate is indicated, not sodium bicarbonate, and charging the solution with carbon dioxide as a substitute for the alkali bicarbonate is to be condemned because carbon dioxide does not have the therapeutic properties of the alkali citrate.

SECOND INTERNATIONAL CONFERENCE ON THE UNIFICATION OF FORMULAE OF HEROIC REMEDIES.*

THE SECOND International Conference on the Unification of Formulæ of Heroic Remedies was held in Brussels, Belgium, September 21st to 29th.

The countries which participated in the Conference were represented by the following delegates:

Argentine, Dr. Zwanck; *Australia,* Dr. C. L. Park; *Austria,* Mr. Georges Brigode; *Belgium,* Prof. E. Hairs, Dr. J. Bartholome, Prof. J. F. Heymans, Prof. M. Ide, Prof. L. Michiels, Dr. A. Schamelhout, Prof. N. Wattiez, Prof. Zuns, Dr. F. DeMyttenære; *Bulgaria,* Mr. Sarafow, Mr. André Kolar; *Colombia,* Dr. de Mesa; *Cuba,* Dr. Luis A. Baralt; *Denmark,* Dr. E. Host-Madsen; *Egypt,* Prof. St. Alban Heathcote, Prof. Ibrahim Ragab Fahmy; *Finland,* Prof. Robert Otto Fredrik Ehrstrom; *France,* Prof. M. Tiffeneau, Prof. Em. Perrot, Prof. L. Grimbert, Mr. Peneau; *Germany,* Dr. Schellhorn; *Great Britain,* Sir Nestor Tirard, Mr. Edmond White, Dr. G. F. McCleary, Mr. R. D. Hutchinson; *Greece,* Prof. Emmanuel; *Holland,* Prof. L. Van Itallie, Dr. J. S. Meulenhoff; *Hungary,* Count O. Woraczicki, Mr. Cornel Tőrők; *Ireland,* Mr. Patrick Brook-Kelly; *Italy,* Prof. Pietro Biginelli, Prof. Bartholomeo Gosio; *Japan,* Mr. Toyosaburo Nozoe, Mr. Sadayoshi Takazawa; *Lettonia,* Mr. M. Maisit; *Luxemburg,* (Grand Duchy),

*Held at Brussels, September 21-29, 1925.

Dr. Razen, Mr. Jos. Schommer; *Norway,* Prof. E. Poulsson; *Peru,* Dr. Carlos F. Frumdick; *Poland,* Mr. R. Debicki; *Roumania,* Dr. J. Vintilesco, Dr. Erigoresco Elvir, Mr. Demètre M. Jonesco; *Serbia, Croatia and Slavonia,* Prof. Adolf Holste, Mr. Vladislav St. Andjelkovitch; *Spain,* Dr. Enrique Soler y Batlle; *Sweden,* Mr. Carl C. H. von Friedrichs, Mr. Felix De Poyron; *Switzerland,* Prof. Eder, Dr. H. Golaz; *Turkey,* Dr. Ibrahim Bey Edhem; *Union of South Africa,* Dr. J. A. Mitchell; *United States of America,* Dr. Andrew G. DuMez; *League of Nations,* Dr. Raymond Gauthier.

The Conference, the first session of which was held at 10 A. M. on Monday, September 21st, was opened by an address by Baron Rolin-Jaequemyns, Minister of the Interior and Hygiene, who, on behalf of the Belgian Government, extended a most cordial welcome to the delegates. On concluding his address, he proposed that the election of officers be proceeded with. Accordingly, Professor E. Hairs, president of the Committee on Organization, was unanimously elected president. The latter then took the chair and made appointments as follows: Prof. E. Poulsson, delegate from Norway, and Prof. L. Van Itallie, delegate from Holland, were appointed vice-presidents. Dr. De Myttenære, chief inspector of Pharmacies of Belgium, was appointed secretary and Mr. J. Carpentier, assistant director of the Ministry of the Interior and Hygiene of Belgium, assistant secretary. Dr. J. Vintilesco, delegate from Roumania, and Messrs. J. Bartholomé, L. Michiels and N. Wattiez of Belgium, were designated assistants to the secretariat. The remainder of the session was devoted to the adoption of rules governing the work of the Conference and to the appointment of committees to consider and report on Topics I and II, IV, V, VI and IX, respectively, of the program, an outline of which follows:

Topic I.—Revision of the decisions of the first Conference.

Topic II.—Unification of the formulæ of other heroic remedies.

Topic III.—Unification of arsenic and bismuth compounds.

Topic IV.—Unification of chemical methods of assay of certain medicaments.

Topic V.—Unification of biologic methods of assay.

Topic VI.—Unification of maximum doses.

Topic VII.—Examination of the proposition to adopt a characteristic container for remedies intended for external use.

Topic VIII.—Regulation of international commerce in narcotics.

Topic IX.—Examination of the project to create a permanent international secretariat of pharmacopœias.

It was unanimously agreed that topic No. VIII should be stricken from the program as the subject was already being dealt with by a special committee of the League of Nations.

Subsequent plenary sessions were held on September 22, 23, 25, 26 and 29. At these sessions, there were considered, in addition to topics III, VII and IX and the reports of the committees, several special propositions, namely: (1) A proposition to adopt a chemical method of standardization of the arsenicals submitted by Dr. De Myttenære of Belgium. (2) A proposition to adopt extracts of unit strength to be used in the preparation of other galenicals submitted by the Swiss delegation. (3) A proposition to study the methods of dealkalinizing glass containers intended for eye lotions and hypodermic solutions submitted by the Swiss delegation. (4) A proposition to compile alphabetically in a small volume all of the decisions on drugs and medicaments made by the Conference submitted by the Swiss delegation.

The decisions reached by the Conference are embodied in the following draft of agreements.

Final Protocol.

The undersigned, Delegates of Germany, Argentine, Austria, Belgium, Bulgaria, Cuba, Denmark, Egypt, Spain, United States of America, Finland, France, Great Britain, Greece, Hungary, Italy, Japan, Lettonia, Norway, Holland, Poland, Roumania, Kingdom of the Serbs, Croates and Slovenes, Sweden, Switzerland and Turkey, met at Brussels on September 21 to 29, 1925, for the purpose of revising "The International Agreement Respecting the Unification of Formulæ of Heroic Medicaments" signed at Brussels, November 29, 1906, and to study matters in general pertaining to the unification of the divers pharmacopœias.

At the end of their deliberations, which are recorded in the minutes of the sessions, a draft of the decisions reached was prepared, a copy of which is annexed hereto, and it was agreed that this draft should be recommended to the respective Governments for approval as soon as possible.

Done at Brussels, September 29, 1925.

For *Germany,* signed: Dr. Schellhorn; for *Argentine,* signed: Alberto Zwanck; for *Austria,* signed: G. Brigode; for *Belgium,* signed: Eug. Hairs, tiez, Edgard Zunz, L. Michiels; for *Bulgaria,* signed: Dr. K. M. Sarafow; for Dr. Ferd. DeMyttenære, Dr. A. Schamelhout, Dr. Jean Bartholome, N. Wat-

Cuba, signed: Luis A. Baralt; for *Denmark,* signed: E. Host Madsen; for *Egypt,* signed: Reginald St.-A. Heathcote, I. R. Fahmy; for *Spain,* signed: Enrique Soler; for the *United States of America,* signed: Andrew G. DuMez; for *Finland,* signed: Robert Ehrstrom; for *France,* signed: Dr. L. Grimbert, M. Tiffeneau; for *Great Britain,* signed: Sir Nestor Tirard, Edmond White, G. F. McCleary; for *Greece,* signed: Prof. Dr. Emmanuel; for *Hungary,* signed: Cornel Tőrők; for *Italy,* signed: Pietro Biginelli; for *Japan,* signed: T. Nozoe, S. Takazawa; for *Lettonia,* signed: J. Maizit; for *Norway,* signed: E. Poulsson; for *Holland,* signed: L. Van Itallie, J. S. Meulenhoff; for *Poland,* signed: R. Debicki; for *Roumania,* signed: J. Vintilesco, D. M. Jonesco, Dr. Grigoresco V. Elvir; for the *Kingdom of the Serbs, Croates and Slovenes,* signed: A. Holste, Ph. M. Vladislav St. Andelkovitch; for *Sweden,* signed: O. Von Friedrichs; for *Switzerland,* signed: R. Eder, H. Golaz; for *Turkey,* signed: D. Ibrahim Edhem.

Final Draft of the International Agreement Respecting the Unification of the Formulae of Heroic Medicaments.

Resolutions

1. Revision of the Convention of 1906.

General.

Article 1. Certain requirements of the Convention of 1906, such as those concerning the degree of fineness of powdered vegetable drugs and the time of harvesting, have been discontinued where methods of assay permit the exact determination of the active principles of the drugs or their preparations and where the active-principle content has been fixed.

Article 2. Tinctures may be prepared by maceration or percolation or in certain cases by solution of a standardized official extract.

Article 3. The tinctures of heroic drugs for which the content of active principles has not been fixed shall be prepared from 10 per cent. of the drug by weight.

Article 4. The tinctures of heroic drugs for which the content of active principles has been prescribed shall if necessary be brought to the required strength by the addition of alcohol of the proper strength.

Article 5. The fluidextracts of heroic drugs for which the content of active principles has not been prescribed shall be prepared in such a manner that one part by weight of the fluidextract will represent one part by weight of the drug.

ARTICLE 6. The fluidextracts of heroic drugs for which the content of active principles has been fixed shall when necessary be diluted to the required strength.

ARTICLE 7. A heroic medicament shall not be given the form of a medicinal wine.

Special.

ARTICLE 8. The medicaments listed in the following table shall be designated in the respective pharmacopœias published by each of the contracting governments preferably by the Latin titles given in the table and shall conform to the standards prescribed therein.

Name of the Medicament	*Standards*
Aconitum Napellus L.	
Aconiti tuber	The dried tubercule.
Pulvis Aconiti	The powder shall contain 0.50 per cent. of total alkaloids. The alkaloidal content is adjusted to this strength by the addition of rice starch.
Tinctura Aconiti	Prepare by the use of 70 per cent. alcohol (by volume). The tincture shall assay 0.05 per cent. of total alkaloids.
Extractum Aconiti	The extract shall contain 1 per cent. of total alkaloids.
Syrupus Aconiti	Prepare the syrup by the use of 5 per cent. of the tincture. It should contain 0.0025 per cent. of total alkaloids.
Atropa Belladonna L.	
Belladonnæ folium	The dried leaves.
Pulvis Belladonnæ	The powder shall contain at least 0.30 per cent. of total alkaloids (provisional standard). It shall be adjusted to this strength by the addition of rice starch.
Tinctura Belladonnæ	Prepare by the use of 70 per cent. alcohol (by volume). The tincture shall assay at least 0.03 per cent. of total alkaloids (provisional standard).
Extractum Belladonnæ	Prepare an extract free from chlorophyll by means of 70 per cent. alcohol (by volume). The evaporation of the liquid extract shall be conducted at a temperature below 50° C. The extract shall contain at least 1.30 per cent. of total alkaloids (provisional standard).
Syrupus Belladonnæ	Prepare using 5 per cent. of the tincture.
Unguentum Belladonnæ	The ointment shall contain 10 per cent. of the Extract of Belladonna.

Name of the Medicament	*Standards*
Lytta vesicatoria Fabr., Epicauta Gorhami Mars and other vesicatory insects.	
Pulvis Cantharidis	The powder shall contain at least 0.6 per cent. of cantharidin.
Tinctura Cantharidis	Prepare by means of 70 per cent. alcohol (by volume) a tincture containing 0.06 per cent. of cantharidin.
Colchicum autumnale L.	
Colchici semen	The dried seeds.
Pulvis Colchici	The powder shall contain 0.4 per cent. of colchicine. It shall be adjusted to this strength by the addition of rice starch.
Tinctura Colchici	Prepare by the use of 70 per cent. alcohol (by volume) a tincture containing 0.04 per cent. of colchicine.
Extractum Colchici	The extract shall contain 2 per cent. of colchicine.
Digitalis purpurea L.	
Digitalis folium	Leaves dried at 55-60°.
Pulvis Digitalis	
Syrupus Digitalis	Prepare using 5 per cent. of the tincture.
Tinctura Digitalis	Prepare from 10 per cent. of the drug (by weight) using alcohol 70 per cent. (by volume).
Hyoscyamus Niger L.	
Hyoscyami folium	The dried leaves.
Tinctura Hyoscyami	Prepare from 10 per cent. of the drug (by weight) using alcohol 70 per cent. (by volume).
Extractum Hyoscyami	Prepare an extract free from chlorophyll by means of alcohol 70 per cent. (by volume). The liquid extract shall be evaporated at a temperature below 50° C.
Uragoga Ipecacuanha H. Bn.	
Ipecacuanha radix	The dried root.
Pulvis Ipecacuanhæ	The powder shall contain 2 per cent. of total alkaloids.
Syrupus Ipecacuanhæ	Prepare the syrup using 10 per cent. of the tincture.
Tinctura Ipecacuanhæ	Prepare by means of alcohol 70 per cent. (by volume) a tincture containing 0.2 per cent. of total alkaloids.

Name of the Medicament	*Standards*
Lobelia inflata L.	
Lobeliæ herba	Dried flowering herb.
Tinctura Lobeliæ	Prepare from 10 per cent. of the drug (by weight) using alcohol 70 per cent. (by volume).
Strychnos Nux Vomica L.	
Strychni semen	The dried seed.
Pulvis Strychni	The powder shall contain 2.5 per cent. of total alkaloids.
Tinctura Strychni	Prepare by means of alcohol 70 per cent. (by volume) a tincture containing 0.25 per cent. of total alkaloids.
Extractum Strychni	Prepare by means of alcohol 70 per cent. (by volume) a defatted extract containing 16 per cent. of total alkaloids.
Opium	Dried latex of the fruit of *Papaver* somniferum L.
Pulvis Opii	The powder dried at 60° C. shall contain 10 per cent. of anhydrous morphine. It shall be brought to this standard by the addition of rice starch or sugar of milk.
Pulvis Opii et Ipecacuanahæ Compositus	The powder shall contain 10 per cent. powdered opium and 10 per cent. of powdered ipecac.
Tinctura Opii	Prepare by means of alcohol 70 per cent. (by volume) a tincture containing 1 per cent. of anhydrous morphine.
Tinctura Opii crocata seu Laudanum Sydenhami	The tincture shall contain 1 per cent. of anhydrous morphine.
Tinctura Opii Benzoica	The tincture shall contain 0.05 per cent. of anhydrous morphine.
Syrupus Opii	Shall contain 0.05 per cent. of anhydrous morphine.
Syrupus Opii dilutus seu Sirupus Diacodii	Shall contain 0.01 per cent. of anhydrous morphine.
Strophanthus gratus Frank. *Strophanthus hispidus* DC. *Strophanthus Kombé* Oliv.	
Tinctura Strophanthi	Take 10 per cent. by weight of the seeds of *Strophanthus hispidus* or of *Strophanthus Kombé*, defat them and prepare a tincture by means of alcohol (70 per cent. by volume).

Name of the Medicament	*Standards*
Tinctura Strophanthi grati	Prepare this tincture in the same manner as the preceding using the seeds of *Strophanthus gratus.*
Claviceps purpureæ **Tul.**	
Secale cornutum	Ergot of rye of the current year preserved whole.
Extractum Secalis cornuti aquosum	Prepare an aqueous extract and dissolve this in alcohol 60 per cent. (by volume).
Extractum Secalis cornuti fluidum	Prepare to represent 100 per cent. of the drug.
Extractum Secalis cornuti fluidum acidum	Prepare to represent 100 per cent. of the drug.
Acidum Hydrocyanicum dilutum	Shall contain 2 per cent. of hydrocyanic acid.
Aqua Laurocerasi	Shall contain 0.10 per cent. of total hydrocyanic acid.
Aqua Amygdalæ Amaræ	Shall contain 0.10 per cent. of total hydrocyanic acid.
Solutio Phenoli	Shall contain 2 per cent. of phenol.
Natrii Arsenas	The crystallized salt assaying 36.85 per cent. of arsenic pentoxide.
Solutio Arsenicalis seu Fowleri	A neutral solution assaying 1 per cent. of arsenic trioxide.
Syrupus Ferrosi Iodidi concentratus	Shall contain 5 per cent. by weight of ferrous iodide.
Syrupus Ferrosi Iodidi dilutus	Shall contain 0.5 per cent. by weight of ferrous iodide.
Solutio Iodi spirituosa	Formula: Iodine 6.5 Gm., Potassium iodide, 2.5 Gm., Alcohol 91 Gm. of 90 per cent. (by volume). The potassium iodide may be replaced by an equivalent amount of sodium iodide.
Cocainæ Hydrochloridum	The anhydrous salt.
Unguentum Hydrargyri	Prepared to contain 30 per cent. of mercury.
Syrupus Morphini	Shall contain 0.05 per cent. of morphine hydrochloride.
Syrupus Codeini	Shall contain 0.2 per cent. of codeine in the form of the alkaloid or its salt.

Name of the Medicament	*Standards*
Syrupus Chlorali Hydrati	Shall contain 5 per cent. of chloral.
Syrupus Hydrargyri Iodidi cum Kalii Iodidi	Shall contain 0.05 per cent. of mercuric iodide and 2.5 per cent. of potassium iodide.
Hydrastis canadensis L.	
Hydrastis rhizoma	The dried rhizome and adventive roots.
Pulvis Hydrastidis	Shall contain at least 2 per cent. of hydrastine.
Tinctura Hydrastidis	Prepare by means of alcohol 60 per cent. (by volume) a tincture containing 0.2 per cent. of hydrastine.
Extractum Hydrastidis fluidum	Shall contain 2 per cent. of hydrastine.
Urginea Scilla Steinh.	
Scillæ bulbus	The dried median scales of the white variety.
Tinctura Scillæ	Prepare from 10 per cent. (by weight) of the drug and alcohol 60 per cent. (by volume).
Acetum Scillæ	Prepare from 10 per cent. of the drug.
Oxymel Scillæ	Shall contain 50 per cent. of vinegar of squill.
Cannabis sativa L. var. *indica* Lamk.	
Cannabis Indica Herba	The flowering and fruit tops (not deprived of resin) of the female plant cultivated in the East Indies.
Extractum Cannabis indicæ	Prepare by means of alcohol 90 per cent. (by volume).
Tinctura Cannabis indicæ	Prepare from 10 per cent. by weight of the drug using alcohol 90 per cent. (by volume).
Solutio Nitroglycerini Spirituosa	Shall contain 1 per cent. nitroglycerin by weight.

Normal Drop Counter.

ARTICLE 9. The contracting Governments shall adopt a normal drop counter which will deliver 20 drops per gram of distilled water at 15 degrees C.

Arsenobenzenes.

ARTICLE 10. After having listened to an explanation of the work of Dr. De Myttenære on the chemical control of the arsenobenzenes, the Second International Conference decided to call the attention of the various Governments represented to the necessity of associating the chemical control of the arsenobenzenes with the biological control.

As a consequence the respective Governments are invited to designate some person who will transmit to the permanent Secretariat the results of their researches on identical samples of these drugs with a view to establishing the modalities of chemical control to be adopted.

Nomenclature.

ARTICLE 11. The international nomenclature shall be written in Latin.

ARTICLE 12. The contracting countries may conserve their own nomenclature by giving at the same time the international title.

ARTICLE 13. The vegetable and animal species shall be designated by their scientific Latin names. For the vegetable species, the Index Kew and its supplements are adopted.

ARTICLE 14. The vegetable and animal drugs shall be designated by the Latin names of the species from which derived, except in certain cases where usage sanctions commonly used Latin name. There shall be prepared a list of such titles.

ARTICLE 15. In the naming of vegetable drugs, the name of the vegetable shall precede that of the part of the plant used.

ARTICLE 16. The titles of drugs shall be written in the singular.

ARTICLE 17. In the nomenclature of galenical preparations, the name of the preparation shall precede that of the drug from which it is made.

ARTICLE 18. The International Secretariat of Pharmacopœias, after having consulted with the committees of revision of the various pharmacopœias, shall define the following terms used in pharmacy; ceratum, decoctum, infusum, extractum, pomatum, sirupus, solutio, tinctura, unguentum, etc.

ARTICLE 19. The title of decoction or infusion shall not be given to mixtures of a fluidextract and water.

ARTICLE 20. In the naming of aqueous solutions, the nature of the solvent shall not be indicated. It shall be indicated in other cases.

ARTICLE 21. In the naming of alcoholic extracts, the nature of the solvent shall not be indicated. It shall be indicated in other cases. In all cases the consistence of the extract shall be indicated.

ARTICLE 22. In the naming of alcoholic tinctures, the nature of the menstruum shall not be indicated. It shall be indicated in other cases.

ARTICLE 23. The name, Tincture, shall not be given to simple solutions of chemical substances.

ARTICLE 24. The names of simple bodies shall be in accord with their chemical symbols.

ARTICLE 25. Account should be taken as far as possible of their chemical functions.

ARTICLE 26. In the naming of salts the international Latin title shall begin with that of the base expressed in the genitive.

ARTICLE 27. Except in the case of necessity, non-scientific names shall not be used as international titles.

ARTICLE 28. In the case of medicaments for which the scientific names are too long, the International Secretariat shall prepare a list of short titles after consultation with the committees of revision of the various pharmacopœias.

ARTICLE 29. The use of names which may be confused with those used to describe products destined for alimentation shall be avoided as far as possible.

Maximum Doses.

ARTICLE 30. By international maximum doses is to be understood those doses administered by mouth to adults once in twenty-four hours, which the pharmacist may not exceed, except when formally ordered to do so by the physician.

ARTICLE 31. The permanent Secretariat was directed by the Conference to consult with the committees of revision of the pharmacopœias of the different nations for the purpose of determining if all of the doses given in the "Table of Maximum Doses" are acceptable to them, and in cases of disagreement to obtain the figures which they propose, together with the reasons for the changes desired.

When the Secretariat has obtained this information, it shall request of those committees whose figures differ from those of the

majority to accept the proposals of the majority in order that an international agreement may be made.

When this has been completed, the Secretariat shall communicate to the Governments the list of maximum doses upon which an agreement has been reached.

ARTICLE 32. The Conference calls the attention of the International Secretariat of Pharmacopœias to the desirability of submitting for study in all countries the proposition of adopting maximum international doses for certain very active medicaments intended for administration by other channels than the mouth, notably, subcutaneously and intravenously.

ARTICLE 33. For the purpose of establishing definitely the responsibilities of the physician and the pharmacist in the dispensing of heroic medicaments for which maximum doses have been provided by the pharmacopœias or international agreement, the Conference invites the Governments to require that in all prescriptions where a maximum dose is exceeded, this dose be repeated in letters and confirmed by a new signature or the initials of the physician.

Permanent Secretariat.

ARTICLE 34. The Conference decided that there is need for the creation of an international body for the unification of pharmacopœias.

ARTICLE 35. The Organization Committee shall, through the Belgian Government, as the intermediary take the necessary steps to bring this matter before the League of Nations in view of the definitive constitution of the permanent Secretariat and of the committees created by the Conference.

During the interim and acting essentially in a provisional capacity the Committee of Revision of the Belgian Pharmacopœia is charged with the duty of functioning as the projected organization in order that no time may be lost and to enable the Secretariat to continue the work uninterruptedly when it is definitely constituted.

ARTICLE 36. In addition to the transmission of documents and the coördination of work concerning the unification of pharmacopœias, the Secretariat was directed to undertake in a general way to carry out the following lines of work proposed by Prof. Van Itallie:

1. Elaborate amendments and additions to the Brussels Convention with respect to the formulæ of heroic remedies.

2. Study the methods for determining the active principles of heroic remedies and draw up proposals having for their object the fixing of the active-principle content of these remedies.

3. Formulate propositions which will lead to uniformity in the nomenclature of the pharmacopœias.

4. Draw up proposals for arriving at unification in the description of chemical products, their identification, analysis, etc., in the pharmacopœias.

Chemical Assays.

ARTICLE 37. The conference is of the opinion that it is expedient to submit to an international committee the study of the unification of methods for the chemical and physico-chemical assay of the heroic medicaments.

It was agreed that this committee should be composed of seven members chosen from among the best qualified representatives of the different nations. The organization of the committee was effected by the members present and rules governing its activities were formulated during the course of the Conference. The following were appointed members of the committee:

Messrs. Van Itallie (Holland), President;
Goris (France),
White (Great Britain),
DuMez (United States),
Gadamer (Germany),
Eder (Switzerland),
Asahina (Japan).

The Conference decided to request the Committee on Organization to inform the Committee on Hygiene of the League of Nations as soon as possible of the creation of this international committee for the study of the chemical assay of heroic medicaments and to request their concurrence.

Galenical Preparations.

ARTICLE 38. The Conference is of the opinion that it is expedient to submit to an international committee the study of the unification of methods of preparation of heroic galenicals. It was agreed that this committee should be composed of eight members chosen from among the best qualified of the different nations. The following were appointed members of this committee:

Messrs. Golaz (Switzerland), President;
Tiffeneau (France),
Greenish (Great Britain),
Cook (United States),
Meulenhoff (Holland),
Vintilesco (Roumania),
Von Friedrichs (Sweden),
Wattiez (Belgium).

The Conference decided to request the Committee on Organization to inform the Committee on Hygiene of the League of Nations as soon as possible of the creation of this committee for the study of the unification of methods of preparation of heroic galenicals and to request their concurrence.

Recommendations.

Nomenclature.

1. It is desirable that the international Latin name of each medicament be placed at the head of the descriptive monograph thereon in the various pharmacopœias.

2. It is desirable to adopt a single nomenclature for chemical compounds analogous to that employed for these compounds, notably, in the pharmacopœias of the United States, Great Britain and Sweden.

Biologic Methods.

3. The Conference, having taken notice of the report of the Committee on Organization on the fifth topic of the program and of the Second International Conference on the Biologic Standardization of Certain Medicaments, makes the following recommendations:

(1) That biologic methods of standardization be introduced into the pharmacopœias in so far as they are recognized as being necessary.

(2) That the pharmacopœias, except for sufficient reasons, adopt the methods which have been or may be recommended by the Committee on Hygiene of the League of Nations.

(3) That the committees of revision of the pharmacopœias transmit to the Committee on Hygiene of the League of Nations all observations or suggestions concerning substitute methods.

Containers.

(4) The conference decided that it would be inexpedient, provisionally, to regulate the use of containers internationally and proposes that the question of labeling and other measures of precaution be studied with a view to the adoption of international regulations.

Miscellaneous.

(5) The Conference expresses the hope of seeing the text of the Brussels Convention in the new pharmacopœias.

(6) The Conference expresses the wish that all of the pharmacopœial committees of revision be made permanent bodies.

(7) The Conference expresses the hope of seeing published as soon as possible all modifications pertaining to the pharmacopœias.

ABSTRACTED AND REPRINTED ARTICLES

CATALYSIS.

By Carol A. Cofman-Nicoresti.

(*Reprinted from The Pharmaceutical Journal and Pharmacist.*)

In the latest book of chemistry, on the subject of catalysis, we meet with the following quaint passages:

"For the immediate purpose it is equally interesting to quote Faraday's conclusions on the mechanism of catalysis, deducted ninety years ago, and to observe the relatively small difference in general outlook in spite of enormously increased detailed knowledge now at our disposal. He is referring specifically to the union of hydrogen and oxygen at a platinum surface. The only essential condition appears to be a perfectly clean and metallic surface." (Catalysis, Hilditch. Chemistry in the XXth Century, page 137.) And again (on page 140). "The most notable recent advances in industrial catalysis are those in which chemical combination is effected at the surface of a solid agent, and it is in this domain that Faraday's insistence on the necessity for a *perfectly clean, pure surface* has been proved to be the perfection of sound advice." After a complete century of research we do believe that it is time to clearly understand and grasp the meaning of Faraday's remarks.

Chemists frankly admit that they do not understand catalysis, and do not know what the action of a catalyst is. They pretend to understand combustion, and undoubtedly know all about chemical reaction.

As both, combustion and catalysis, are chemical reactions, it seems puzzling that any difficulty should be experienced in understanding the mechanism of catalysis. By chemical reaction chemists understand the change undergone by various substances while being transformed into new substances.

The explanation for this occurrence is attributed to the chemical affinity which is supposed to exist between elements. An explanation which does not carry the question any further, but simply restates the facts in other terms. We do not know why certain substances or elements combine to form new substances. We are told that there exists a certain affinity between these elements which means exactly the same thing, namely, that they combine together, but the reason why they do so remains a mystery.

The Frame of Substances.

All substances, elements or compounds, occupy space and consequently consist of a frame. These frames consist of a conglomeration of similar molecules which, in their turn, are divisible into atoms. There is actual evidence that there must be interatomic spaces or at least openings in the body of these substances caused by the shapes of atoms. However close together the atoms are packed there seem to be unavoidable spaces through which other atoms of either smaller size or different shape may enter these bodies. We can easily conceive matter circulating through the interatomic spaces, and even exchanges of material taking place between the frames of bodies, and that the substances still keeping their shape and composition, as long as they remain undisturbed. On the other hand, if external pressure should push one frame against another, there may come a moment when these frames will collape, and a new rearrangment of atoms take place. A new substance of a different structure and composition will result. All substances are the result of the combination or dissociation of pre-existing substances. Every chemical reaction does doubtlessly involve firstly the breaking up of an old structure before a new one can be obtained. It follows that every chemical reaction involves the breaking up of an existing structure.

The breaking up of a structure requires pressure. The rearrangements of the new structure necessitates movement. Movement necessitates space. Pressure in itself is also movement or the effect of movement.

Consequently, a chemical reaction will take place under two conditions—namely, if pressure and enough space for the movement necessitated by such reaction is available. All chemists know that pressure plays an important part in chemical reactions, though they may not realise the extent of the part played.

Concerning space, I am not aware that this point has ever been considered at all. We must not forget that when we speak of substances we include all substances, be they gases, liquids, or solids. We take it that all these substances consist of a frame built of molecules which, in their turn, consists of atoms banded together. By the impenetrability of matter we recognise that every substance must occupy a certain space, even if we admitted that on account of the interatomic spaces there may be a possibility of varying the size of space within certain limits. There must be a minimum space for each substance which cannot be suppressed. Two frames pressed against each other when occupying the minimum space cannot be smashed on account of their resistance. If, on the other hand, room be allowed for part of the disintegrating parts to squeeze out, then their shapes will collapse. In every chemical reaction this space must be present or provided for. If we carefully examine the reactions which require a catalyst, we shall find that the catalyst is simply a means of providing the escape or the supply of heat at a certain rate. The best catalysts are usually of metallic nature. Their action is purely physical in providing an exit for the heat of reaction. The catalyst plays the same part as a valve does in a pump or a syphon. Sometimes it may play only the part which a filter paper plays in separating the solids out of a solution or as the endosometer in osmosis, simply separating one element from another in space. Professor Bone and Dr. Irving Langmuir have contributed very valuable facts and devoted enormous study to this question. I am able to quote only a few of their facts and conclusions. Those specially interested in this subject may take time to read their works on catalysis, and find for themselves how consistently the view that the action of a catalyst is simply that of a separator of heat from the other elements in the reaction is confirmed.

Langmuir's Experiments.

Under the title "Heterogeneous Reactions," an address by Dr. Irving Langumir ("Catalysis, with Special Reference to Newer Theories of Chemical Action," Faraday Society, page 617), we read:

"If a plane surface of platinum be heated for the first time in a mixture of hydrogen and oxygen, when the reaction has occurred the catalyst becomes modified and the reaction proceeds. Such effects are due to catalytic poisons, but there is good evidence that the effect is frequently caused by changes in the structure of the surface itself, brought about by the reaction. This is particularly noticeable in the catalytic oxidation of ammonia in contact with platinum wire. After the wire has been used, the surface becomes very rough, and gradually disintegration of the wire occurs, because of the surface changes taking place. The catalytic activity of the wire is very low when first used, but becomes much greater after it has become activated by the reaction itself. The changes that occur in the surface of the platinum under these conditions seem to be exactly similar to those that are caused by rapid fluctuations of temperature. When tantalum filaments, or improperly made tungsten filaments, are run in a lamp on alternating current, the wire shows a tendency to offset, but this effect is entirely absent if the wire is heated to the same temperature by continuous current. The offsetting consists of a slipping of the crystals of the metal along the boundary planes. In extreme cases it leads to a nearly complete disintegration of the metal. Experiments show that this effect is directly dependent upon the rapidity of fluctuation.

"Anything that increases the rapidity of temperature fluctuation, such as the introduction of hydrogen into the bulb, increases the rate at which offsetting occurs, so that it is possible in a few minutes to produce as much offsetting as would otherwise occur during hundreds of hours. Under these extreme conditions, the rate of cooling of the filament is of the order of a million degrees per second. If a Coolidge X-ray tube is operated exclusively with direct current, even during manufacture, the surface of the target retains a high polish, even after long use. A few minutes running with alternating current roughens the surface of the target, and it is well known that the focal spot in the target assumes appearance which is quite analogous to that of the platinum surface used as a catalyst for the oxydation of ammonia. It is highly probable that the cause is the same in both cases, namely, sudden fluctuations in temperature between adjacent atoms in the material."

The above facts given by Langmuir confirm the view that the platinum acts practically as a sieve through the meshes of which the heat runs at varying speeds. If the rate of heat passage is uneven the atomic structure of the platinum is disturbed and even disintegrated. Further, on page 600, Dr. Langmuir states: "We have a large number of natural phenomena which are characterised by this; that if we plot the logarithm of some quantity, we will say Y, describing the phenomenon against the reciprocal of the temperature, you get a straight line. Now, what are the phenomena that are characterised by this relation? In the first place, we have vapour pressure. If you plot the logarithm of the vapour pressure of water, mercury, or anything else against the reciprocal of temperature, you get a straight line. The logarithm of the rate of evaporation of substances, or the velocity of any chemical reaction, plotted against the reciprocal of the temperature, gives a straight line. The rate at which a glass rod heated to a certain temperature will elongate, plotted on semi-logarithmic paper as the function of the reciprocal of temperature gives a straight line. The same is true of the electrical conductivity of glass as a function of temperature. We come finally to Wien's equation, which gives the same relation between the intensity of the monochromatic radiation from a black body and the temperature of the body. We like to get one explanation of all these phenomena. Every chemical reaction involves discontinuous processes.

"There has got to be a point where the molecule changes from a single molecule to two molecules. The discontinuous nature of the change is illustrated by the change in specific heat."

On page 612: "With a clean platinum surface, which had been made catalytically active by bringing it into contact with a mixture of oxygen and hydrogen at low pressures at a temperature of about 300° C., the adsorption phenomena were totally different from those observed with glass and mica—at least in the case of the gases hydrogen and oxygen and carbon monoxide. When small amounts of oxygen were allowed to come in contact with the platinum surface, the oxygen disappeared almost instantly, until the total amount adsorbed corresponded to a monomolecular or monoatomic film, and then no further amount of this gas could be adsorbed, even with a great increase in pressure. No trace of the oxygen could be pumped off by heating the platinum in the best vacuum to 360° C."

Knudsen and R. Wood independently arrived at the conclusion that mercury or cadmium atoms condense on a glass surface only if this surface is cooled below a certain critical temperature.

Dr. Rideal (page 655, *id.*) says: "Then we are also faced with the phenomenon of auto-retardation, *viz.*, the products of the reaction cannot *always get away,* and that left Bancroft to put forward his postulate that those substances were only catalytic that absorbed the products of reaction, and he cited certain cases including uranium in the catalysis of nitrogen and hydrogen to form ammonia."

Prof. Bone's Conclusions.

Prof. Bone (*id.* page 659) says: "The aforesaid researches of Dr. Wheeler and myself upon the catalytic combusion of hydrogen, in the course of which the action of a great variety of surfaces (*e. g.*, porous porcelain, magnesia, platinum, gold, silver, nickel, copper, and certain easily reducible metallic oxides) were examined in detail, led us to the conclusion that the essential function of the surface is always to activate the reacting gases, or at least one of them; and that such activation is brought about by the occlusion of the gases by the surface—by the dissociation or ionisation of the hydrogen molecule at the moment of its occlusion. We also showed experimentally not only how the activity of a surface at any given temperature may be stimulated by previous exposure to hydrogen, but how, in certain cases, when copper is used the surface may be blanketed by a film of condensed and activated oxygen. Upon it we claim recognition as the originators of the basic idea that the function of the surface is to activate by dissociation (or ionisation) the gases at the moment of their occlusion by it. Later, in conjunction with Mr. H. Hartley, I discovered that the adsorption of the gases in contact with a metallic surface such as gold or silver is accompanied by certain electrical effects. Sir J. J. Thompson suggested that the action of surfaces might ultimately be found to depend on the fact that they formed a support for layers of electrified gas in which chemical changes proceeded with high velocity. I reviewed my research, summarising my views as follows:—(1) The power of accelerating gaseous combustion is possessed by all surfaces at temperatures below the ignition point in varying degrees, dependent upon their chemical characters and physical texture; (2) That such an accelerated surface combustion is dependent upon an adsorption of the combustible gas, and probably also of the oxygen, by the surface, whereby it becomes activated (probably ionised) by association with the surface.

"(3) That the surface itself becomes electrically charged during the process.

"(4) That the same power must also be manifested in even a greater degree at higher temperatures, and especially so when the surface itself becomes incandescent;

"(5) That the temperature rises, the differences between the catalysing power of various surfaces, which at low temperatures are often considerable, diminish, until at bright incandescence they practically disappear."

The Mechanism of Catalysis.

Carefully sifting all facts and observations concerning catalysis, we notice firstly: A catalyst undergoes fluctuations of temperature due to the chemical reaction. Secondly, that the catalyst helps the reacting gases to separate from their heat, which process some observers have named ionisation. Most of the observers have naturally concentrated all their attention to the surface of the catalyst.

We have to consider the whole of the chemical reaction in which the catalyst plays only a certain part.

It is clear that the chemical reaction in catalysis, similarly to the chemical reaction in oxidation or combustion, takes place between two or more substances which are parting with their heat of formation or are absorbing heat from other substances. In as far as we can realise, in catalysis, an independent substance, that is one which will not form any component part of the resulting substances, helps the reaction, by allowing liberated heat to get away or external heat to join in. If heat had no volume there would be no need for a means of its escape being provided, and the catalyst would bear no traces of forced passages through its structure.

The catalyst is thus acting as a filter or sieve through which heat is running away and allowing room for new substances to be formed, by the different atoms of the elements pressed together. Faraday's insistence on a perfectly clean pure surface becomes obvious. A sieve must be kept clean if it is to do its work. Any bad conductor of heat coating the surface of the catalyst will impede the catalytic reaction. Bone's remark that the surface of the catalyst becomes electrically charged during the process is very important, as it shows that elements of light also escape through the catalyst.

Scientists and Catalysis.

Prof. H. E. Armstrong, F.R.S., contributes a paper on "Catalysis and Oxidation" to *Nature* (August 22, 1925), which was given as

an address before the Solvay International Institute of Chemistry. He agrees with the views expressed above—namely, that an understanding of catalysis implies an explanation of the process known as chemical reaction. He limits the term Catalysis to reactions *at,* and *influenced* by, solid surfaces, which is not such a clear definition as the one suggested above--namely, that a substance, whatever its state or nature may be, as long as it is not in chemical combination with the reacting substances before, and remains unchanged and free after, the chemical reaction is completed, is a true catalyst; and the reaction a true catalysis. Prof. Armstrong's contribution, divested of its obscurantist technicalities, amounts to the suggestion that chemical change is an electrolytic process. Since he does not reveal the nature of electrolysis, by introducing indefinite terms like "determinant," it does not help much to fathom the meaning and working of chemical reaction. Still more disappointing is the conclusion reached in the end, that "little can be said with advantage until we know far more. . . ." We are now compelled to find the reason why scientists do not solve the riddle of chemical reaction.

Wanted: Exact Definitions.

It is highly puzzling that in no book of science is there to be found a definition, clear and true, of "solids, liquids, and gases." It is curious and perplexing how trained observers through centuries should have missed such obvious and well-defined characteristics as those presented by these three states of matter: a solid has invariably and permanently a spontaneous movement in the direction of its earth-turned surface; a liquid has, in addition to the above movement, a lateral movement, spontaneous, continuous, and inseparable; a gas has a radiating, centrifugal, spontaneous, permanent movement. These salient features of the states of matter are self-evident, and so obvious that the most unobservant and unreflective student could not possibly overlook them.

If to these spontaneous movements possessed by every substance we add the movements transmitted and caused by the environment surrounding substances, the cause of all chemical reaction will become clear. The only obscure point is our complete ignorance of the shape of atoms, which certainly must decide the results of a chemical reaction. Whenever these shapes of atoms belonging to different substances fit into each other, a new compound will result; if not fitting, then a breaking-down process will take place.

GIRARD'S TALK OF THE DAY.

PHILADELPHIA flows steadily past its bi-centennials, sesqui-centennials and centennials.

There are all around us so many things of importance which are now 100 years old it is impossible to call the roll of these ancients.

Yet one especial centenarian has attracted no notice, although for three-quarters of a century it had not even one competitor in the United States. I have in mind the AMERICAN JOURNAL OF PHARMACY.

This was not only the first American publication in the field of pharmacy, but for about 75 years it remained the only one. I know of no other trade or class magazine which, having attained world-wide attention, was left alone in so important a field for so long a period.

That strange condition was doubtless due to the high standard set by this Philadelphia pioneer and which others hesitated even to imitate.

American pharmacy was born in this city.

At any rate, here was born the first school to educate pharmacists and credit goes to Charles Marshall as the father of it.

But our Philadelphia College of Pharmacy, which started 104 years ago, was several years old before it issued in 1825 the first pharmaceutical journal on this continent.

Young men unafraid, that's what those daring spirits were who went scouting through a hitherto unknown territory of science. Up until then, a druggist was a peddler of herbs and crude lotions, but Marshall, whose famous father before him had kept an apothecary shop, saw the necessity for a better education for what we call a druggist.

And it was to promote the wider spread of such knowledge that the toddling young college issued the JOURNAL OF PHARMACY.

Years ago, it was very properly renamed the AMERICAN JOURNAL OF PHARMACY.

* * * *

This century plant in journalism has had ten editors, some of whom were marked men.

Samuel B. Smith, the first one, was in his early thirties when he assisted in creating the new college. He was about the liveliest youngster in the city and left a deep impress in American pharmaceutical affairs.

Of a different type was the second editor, Benjamin Ellis, born up in the beautiful Valley of Muncy, where his Quaker ancestors had long before established a home.

Ellis was succeeded in the chair of materia medica in the college by Franklin Bache, great-grandson of Franklin, and who when a little boy of six saw his father, the noted editor of the Aurora newspaper, die in the great yellow fever epidemic.

* * * *

But of all the early editors of this oldest American pharmaceutical magazine none brought to it wider fame than Dr. Joseph Carson, father of Hampton L. Carson, former Attorney General of Pennsylvania.

He was a professor in the College of Pharmacy. Indeed, he was editor during the whole time he held a professorial chair or until he resigned to go to the University of Pennsylvania.

Botanist, physician, ship's surgeon who visited many lands, Dr. Carson was also a man of letters.

His book on medical botany, illustrated with 100 colored plates, was considered a magnificent thing some eighty years ago and it is now looked upon as a rare work.

Dr. Carson was an accomplished historian and writer who for many years was curator of the American Philosophical Society.

When you study the work done by this pioneer journal in American pharmacy you will agree that it by no means stands at the foot of that long list of notable American "firsts" for which Philadelphia must ever be famous.

(Reprinted from *The Philadelphia Inquirer.*)

MEDICAL AND PHARMACEUTICAL NOTES

LEADED GASOLINE RENAMED TO INSURE SAFETY.—"Motor fuel" instead of "gasoline" is the label which gasoline treated with tetraethyl lead, the anti-knock compound, will wear when again placed on the market.

The committee of the United States Public Health Service which after investigation decided to allow the sale of leaded gasoline provided for this safeguard of the public.

If leaded gasoline were sold as "gasoline" many housewives, mechanics and others using it as a cleaning fluid might become poisoned through absorbing in their bodies the lead it contains. The new label, "motor fuel," will show that leaded gasoline is to be used for power generation only.

Scientific members of the commtitee, representatives of state health departments, manufacturers and distributors who decided on the change, also agreed to make the places where the poisonous, concentrated tetraethyl lead fluid is added to the gasoline as few as possible, so as to lessen the danger to workers.—*Science Service.*

SOLVING THE RIDDLE OF INSULIN.—Insulin, the extract from the pancreatic gland, that was first prepared by Banting and Best at the University of Toronto three years ago and since used extensively in the treatment of diabetes, may soon be made by synthesis in the chemical laboratory, according to a statement by Professor Treat B. Johnson of Yale University at the American Chemical Society meeting here this week.

Professor John J. Abel of Johns Hopkins University, who has been studying the structure of the natural insulin, has come to the conclusion that it is an "auto-oxidizable sulphur compound, probably of the thio-peptide type." This means that it is an unstable substance similar to ordinary albumin in composition but simpler in structure. Professor Johnson announced that research has been started in the Yale laboratories on the structure and reactions of this kind of compound in the hope that it may lead to a method of making it artificially, or to the discovery of a substitute of value in medical science.

Insulin belongs to the class of secretions of the ductless glands, known as "hormones," which in minute amount circulate through the blood and control bodily processes. Insulin is the hormone that regulates the utilization of sugar from which the muscles obtain their energy. In diabetics it is lacking but may be supplied by injections of the prepared insulin.

INTERNATIONAL CONGRESS OF PLANT SCIENCES (Fourth International Botanical Congress).—Investigators and teachers in the plant sciences, representing all aspects of botany, plant chemistry, plant pathology, pharmacognosy, and bacteriology, agronomy, horticulture and forestry, are invited to attend the International Congress of Plant Sciences to be held at Ithaca, August 16-23, 1926. This invitation is extended to all countries of the world.

This Congress is scheduled to follow the usual academic sessions abroad, also the short summer session of the various universities and colleges in the United States. It is believed to offer the first opportunity ever arranged in the United States for a general conference of all those professionally engaged in plant work. It possesses the additional compelling interest accruing from unrestricted international representation.

In order that a part of the program may be representative of outstanding leadership, the Congress will be divided into about one dozen sections, each section with an invitation program occupying about four morning sessions or a little more than one-fourth of the available time. These formal programs will be supplemented by another feature that promises also to be of exceptional interest. Ample time will be set apart for round table or informal discussions, which in some cases may be scheduled in advance, and in others may be arranged both as to topics and participation after the Congress actually convenes. This is intended to provide for the widest participation in sectional activities. Supplementary opportunities for individual contact and participation are made possible through the noncommercial exhibits and through the provision for excursions and inspection tours of various types suited to the diverse needs of the different sections.

Although the Congress is not to provide an occasion for *legislation* on regulatory matters of international significance (such as nomenclatorial rules) the organizing committee has expressly provided

that "adequate opportunity shall be accorded all sections for the *discussion* of regulatory recommendations of international significance," in order that a better understanding may be reached for definite action at a subsequent international congress.

The sections thus far authorized and the secretaries representing these groups are as follows:

Agronomy—C. H. Myers, Cornell University, Ithaca, N. Y.

Bacteriology—J. M. Sherman, Cornell University, Ithaca, N. Y.

Cytology—L. W. Sharp, Cornell University, Ithaca, N. Y.

Morphology, Histology and Paleobotany—D. S. Johnson, Johns Hopkins University, Baltimore, Md.

Pharmacognosy and Pharmaceutical Botany—H. W. Youngken, Massachusetts College of Pharmacy, Boston.

Taxonomy—K. M. Wiegand, Cornell University, Ithaca, N. Y.

Ecology—K. L. Shantz, Bureau of Plant Industry, Washington, D. C.

Forestry—R. S. Hosmer, Cornell University, Ithaca, N. Y.

Horticulture—A. J. Heinicke, Cornell University, Ithaca, N. Y.

Physiology—G. F. Curtis, Cornell University, Ithaca, N. Y.

Pathology—Donald Reddick, Cornell University, Ithaca, N. Y.

Mycology—H. M. Fitzpatrick, Cornell University, Ithaca, N. Y.

Genetics—C. E. Allen, University of Wisconsin, Madison, Wisconsin.

Communications regarding the Congress should be addressed as indicated below:

(1) Concerning round tables and other strictly sectional matters—to the appropriate sectional secretary.

(2) Concerning exhibits and general program matters—L. W. Sharp, Cornell University, Ithaca, N. Y.

(3) Concerning excursions, collecting trips, inspection tours, local arrangements, transportation, etc.—H. H. Whetzel, Cornell University, Ithaca, N. Y.

(4) Concerning the Congress in general—B. M. Duggar, Missouri Botanical Garden, St. Louis, Mo.

Bootleg Cosmetics.—The monthly publication "Health" issued by the New Hampshire Board of Health, refers, under above title to the several forms of hair dyes, beautifiers and other cosmetics now common in sale. At the recent meeting of the American Medical Association, a paper was read before the section of Dermatology and Syphilology on this subject, which appeared in the issue of the

journal of the association in June last. The authors were Drs. Miller and Taussig. The discussion on the paper was interesting and informing. The following is a summary of the paper and discussions as given by the above publication of the New Hampshire State Board of Health:

The classifications considered are face powders, rouges, lip colorings, hair dyes, wrinkle removers and nail polishes. The principal criticism directed at the artificial aids to color was that these contain aniline dyes, some of which are poisonous and tend to set up dermatoses. The authors declare that amongst hair dyes the aniline derivative known as paraphenylene diamine is the arch offender, although those based upon lead are nearly as bad. The para type of dye, reserved for special treatment in a subsequent article in this series, came in for special condemnation as being notoriously harmful and the cause of thousands of cases of injury.

The salient feature of the presentation of the above paper was the testimony concerning the widespread harm done by these preparations. One skin specialist declared that "not a day passes that I do not see a case of dermatitis which I can say definitely is due to cosmetics." The physician points out however that even the excessive use of such a substance as talc may occasion a mild eruption.

According to Miller and Taussig, while "the areas of dermatitis may at times be alarming, they are not to be compared with the toxic symptoms that may arise from the use of certain dyes, especially those containing lead and the aniline derivatives. The patient may suffer from inability to sleep, dizziness, weakness of the legs, attacks suggesting epilepsy, stomach upsets, diarrhœa, neuritis or poor eyesight. Several deaths are reported from the use of hair dye. Nott recently reported the occurrence of severe symptoms that almost ended fatally in a man who applied hair dye to his patrons without wearing rubber gloves. He absorbed some of the drug through the skin of his hands and arms, and also inhaled the fumes while applying it. Men with dyed mustaches or women who hold the strands of dyed hair between their lips run additional risks of poisoning and toxic symptoms."

Not all of the methods employed for the treatment of wrinkles are harmful, but some of them are decidedly so. As suggestive of the lengths to which some of these "beauty parlor" charlatans do not hesitate to go, the following is quoted:

"Carbolic acid was painted over the entire face and neck with the idea that the resultant superficial fibrosis would remove the wrinkles. On the following day the entire swollen and puffy area is covered over with strips of adhesive tape. This is allowed to remain for forty-eight hours and then is removed along with the superficial layers of cauterized epidermis. A powder of some sort is applied to the swollen and oozing skin that remains. The resultant crust remains for two or three weeks and then separates, leaving a very red and board-like skin. We saw one of our patients three months after the treatment had been given. She was unable to close one eye on account of excessive fibrosis, and a rather severe ectropion will undoubtedly always remain. The cheeks were so stiff and board-like that the patient was unable to whistle, and ate with some difficulty. We have seen in the newspapers of a neighboring city the report of the deaths of two women from this procedure. In both, the face, neck and arms had been treated."—H. L.

DIABETES INSIPIDUS CAUSE BELIEVED FOUND.—A cure for diabetes insipidus, a disease which is characterized by the excessive elimination of water by the system, may soon be won by medical science.

The first step toward this end has been made by Dr. Helen Bourquin, professor of physiology at the University of South Dakota, who has duplicated in animals all the symptoms of the disease as they are exhibited by afflicted humans.

Application of electric cautery to the pituitary—a small gland in the head—was the procedure which resulted in experimental diabetes insipidus in dogs.

The discovery appears to have revealed the mechanism which regulates the amount of water in the body. "The operation leads to actual drying up of the animal, if the water intake is restricted," Dr. Bourquin stated.

"The disease appears to be due to the discharge into the blood of something which stimulates the kidneys powerfully."

SCIENTIFIC AND TECHNICAL ABSTRACTS

THIOCYANOGEN NUMBER: A NEW DATUM IN ANALYSIS OF OILS AND FATS.—An extended paper by H. P. Kaufmann (*Archiv. d. Pharmazie,* 1925, *263,* 675) reports a study of thiocyanogen and many of its compounds, leading up to an application in analysis as a substitute for bromine and iodine in the familiar use of these halogens for measuring the amount of unsaturated fatty acids. Thiocyanogen (CNS) is analogous to the halogens in many of its reactions. Its existence was first recognized by Berzelius in a study of sulphur compounds. He noted its function as a radicle and called it "rhodan," presumably from the bright red reaction with ferric salts. It has long been known as existing normally in saliva in combination. Kaufmann's paper was read at a meeting of the German Pharmaceutic Society in Berlin on October 14, 1925. In some of the work he was assisted by Hans Wette.

The methods of preparing the free thiocyanogen are described in detail and many of the reactions noted. For the application of the radicle to analysis a solution in glacial acetic acid is used, a form that has not heretofore been applied. It is necessary that the solvent should be practically anhydrous. The condition was obtained by distilling the best quality available in the market over phosphoric anhydride. A delicate test for freedom of the reagent from water is that it is colorless. Minute traces of water cause a rose color due to the hydrolysis of the thiocyanogen by which a small amount of thiocyanic acid is formed which reacts with the trace of iron present in the acetic acid. The solutions used by Kaufmann were perfectly colorless, undistinguishable from the glacial acetic acid itself.

In the application of the test amounts of the oil samples from 0.1 to 0.2 gram were used. Comparisons with standards of halogen absorption were made in great number and the figures given. Among the oils tested were: Castor, olive, arachis, almond, and sesame. The figures show close agreement of the thiocyanogen number with those obtained by the standard iodine methods. Prolonged action was permitted in many cases and slightly increased absorption was usually noted. Fatty acids were also tested, among which were: Oleic, elaidic, erucic, brassic, behenic and linoleic.

The investigation was very extensive and is still in progress, the investigators asking that the field be left to them.—H. L.

CURRENT TOPICS

PRODUCTION OF GOLD IN 1924.—The world's gold mining in 1924 was not widely active, the Transvaal alone showing increased yield, being in fact one of its best years. The output was 9,597,643 ounces fine, valued at about $180,000,000. The total production of the year was less than double the African yield. About 71 per cent. was from British Empire territory. The United States produced about two million and a half ounces, California, Colorado, Alaska, South Dakota, Arizona and Nevada, being the contributing states, the relative amounts being the order given. Canada produced about one million and a half ounces, principally from Ontario. France itself produced no appreciable amount but small yields were obtained in Algiers and Madagascar. It is most unfortunate that the platinum production does not reach such figures. It is interesting to note that the British Empire has a strong hold on certain natural productions, such as gold and rubber, but the economic problem of the greatest importance to British statesmen is to secure supplies of oil. It appears from the above figures that British territory yielded gold enough to purchase the oil necessary for the operation of British ships and other oil-using industries, but while conditions of peace permit such easy exchange, war would seriously alter these opportunities and gold cannot be a substitute for any other raw material of importance. H. L.

BLUE COAL.—Mechanical engineers, especially those that give particular attention to combustion problems, are fully aware of the term "white coal" that Continental engineers have introduced as meaning water power. The application of tidal movement as a source of power has been a hope for a long while, especially since the development of electric transmission. The utilization of the waves has also been a matter of study. *Revue Scientifique* states that a tide-motor is in successful operation in Finistére, and that the wave-motor is still more promising. It briefly notes an experimental apparatus that has been installed at Monaco. A trumpet-shaped pipe receives the wave and directs it against the blades of a turbine operating a dynamo. A number of such pipes arranged in parallel can be installed. In very stormy weather it is necessary to close the pipes by doors. It is suggested that wind-motors might be installed along

the coasts, using a method of concentrating the air movement on the blades of turbines, similar to those used in the wave-motors. To this use of wave motion the French journal applies the term "blue coal." H. L.

NEWS ITEMS AND PERSONAL NOTES

NEW OFFICERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.—The Board of Canvassers, of which Prof. E. V. Howell is chairman, and the other members are Profs. J. B. Beard, and E. V. Keyser, have announced the results of the recent elections for officers of the American Pharmaceutical Association, 1926 to 1927.

President—Theodore J. Bradley, Massachusetts.

First Vice-President—George Judisch, Iowa.

Second Vice-President—Arthur G. Hulett, Arizona.

For members of the Council—James H. Beal, Illinois; Charles H. LaWall, Pennsylvania; William H. Day, Illinois.

These officers will be installed at the meeting in Philadelphia, September of this year.

THE THIRTIETH CHEMISTS' EXHIBITION, organised by the "British and Colonial Pharmacist" will be held in the Holland Park Hall, London, W., from May 10th to 14th, 1926. All members of the drug and chemical trades who are in England during the week, will receive a cordial welcome on presentation of their professional or business cards. The Exhibition will be the largest yet held and will contain much of interest to all connected with pharmacy and allied callings.

NATIONAL FORMULARY V CANNOT BECOME OFFICIAL BEFORE JULY 1, 1926.—The American Pharmaceutical Association announces that the National Formulary V cannot become official before July 1, 1926. The new edition (N. F. V) will therefore not be available for the present school semester nor for spring examinations by boards of pharmacy. This announcement is made so that pharmacy schools and state boards of pharmacy can govern themselves accordingly.

This information will be of value to the board members and faculties and to some extent to the drug trade in general, and therefore this communication.

DR. MURRAY GALT MOTTER, DECEASED.—Dr. Murray Galt Motter, fifty-nine years old, former commissioner of pharmacy for the District of Columbia and later chief inspector and deputy health officer, here, died of heart disease at his residence, 2314 Nineteenth Street, Thursday, January 14.

His last important position was as director of library service for the Public Health Service, where he worked until retiring in 1924.

Coming to Washington in 1896, Dr. Motter since that time had been connected prominently in medical circles. He was permanent secretary of the Medical Society of the District of Columbia, and he was twice a delegate to the conventions for the revision of the pharmacopœia of the United States. In 1900 he was one of the signers of the articles of incorporation of the convention and served as assistant secretary while a delegate. At the convention in 1910 he became secretary and was listed in the reports of the convention as one of those "who have been of especial assistance during the work of revision."

In 1908 Dr. Motter served as secretary to the National Confederation of State Medical Examining Boards.

Born in Emmitsburg, Md., August 29, 1866, Dr. Motter was privately tutored until he entered Pennsylvania College, Gettysburg, where he received an A. B. degree in 1886. He was awarded a B. S. degree a year later, and received an M. A. degree in 1889.

He was graduated in medicine from the University of Pennsylvania in 1890, and practiced for several years in Lancaster, Pa., and then in Philadelphia before coming to this city.

Dr. Motter lectured on applied anatomy, and in 1901 became professor of physiology at Georgetown University, and taught there continuously until 1905.

He was made commisisoner of pharmacy for the District of Columbia and served until 1906 and from that year until 1908 he was chief inspector and deputy health officer for the District.

He entered the United States Public Health Service during 1908 and served until retiring as director of library service in 1924.

Dr. Motter was married to Miss Ellen Sitgreaves Vail in Philadelphia in 1897. He leaves his widow; his mother, Mrs. James T. Motter, both of this city; a daughter, Mrs. E. G. Miller, Jr., of New York, and two sons, T. H. Vail Motter and James T. Motter.

BOOK REVIEWS

"WELLCOME" PHOTOGRAPHIC EXPOSURE CALCULATOR, HANDBOOK AND DIARY, 1926. Burroughs, Wellcome & Co., 9 E. 41st St., New York City. Price $0.75.

A noticeable feature of the present edition is that the table devoted to the relative exposures necessary when using different brands of development papers, from bromide to the most contrasty makes of the so-called "gaslight" variety, has been considerably increased. In fact the comparative factors for these papers together with those for lantern slides now occupy three pages and the information is more complete than that available from any other source with which we are cognizant.

It is interesting to note in passing that some slow gaslight papers require over 2000 times as much exposure as the fastest bromide papers and that there are many stages between these extremes. The modern warm black papers occupy an intermediate position, being from 64 to 128 times, or more, slower than the fastest bromides.

These tables, together with those devoted to the classification of practically all makes of plates and films according to their exposure speeds and their development speeds make this book the most complete encyclopedia of speed rating published.

Every plate and film is tested by laboratory methods and the laboratory tests are checked by actual use in the field by means of the exposure calculator which is included in each copy.

There are many refinements in speed testing and much difference of opinion between scientific authorities as to methods, and plate makers, as to speed numbers. But the broad method adopted by Burroughs, Wellcome & Company based as it is on scientific tests, checked by camera tests in which the factors are employed as they would be used by the photographer in his everyday work, probably provides the most rational method available today.

The keynote of the whole book is definite and practical instruction. Not only is the photographer told how long to expose a given plate or film but he is told how long to develop it at certain temperatures; how to finish off his negative by the most approved method and how to get the best print from it. There is in fact no simpler or more direct guide to the essential processes of photography for the beginner and there is a wealth of reference matter, tables, etc., which no expert can afford to be without.

CENTENARY NUMBER OF THE AMERICAN JOURNAL OF PHARMACY, DECEMBER, 1925.—Pharmacy today is in a state of war. It is suffering from internal ruptures and foreign invasion. The rapid changes in merchandising methods, cut prices, prohibition, too many stores, etc., constitute the internal disturbance. Hospitals, the enormous increase of chain and department stores, special perfume and medicine shops, unrestricted manufacturing of medical products, etc., form the exterior invasion. But the most important of all is the commercialism of both. The prescription counter is constantly moving further back, rapidly becoming a feature without a specific place in an establishment. And the modern pharmaceutical press with very few exceptions change their reading and advertising pages from drugs to specialties of such a character, that the only indication as to the class of the publication, is the cover which retains the name, drug, pharmacy, or any other specific word belonging to this profession.

But at this time of tremendous pressure, with such a congested atmosphere creating a desire to stop working for betterment or advancement, a rainbow of light with powerful healing ray shines above the horizon. The centennial number of the AMERICAN JOURNAL OF PHARMACY is that rainbow of light and hope. One hundred years of continual progress without a stop, spreading the message of professional pharmacy.

Dr. Charles H. LaWall in his article "A Modern Slogan With An Ancient Origin," reviewing the history of pharmacy, correctly states that: "One of the troubles of pharmacy is that its members do not know enough about past history of the profession." It is remarkably true. Love for a country is created by knowing her history. A good historical course of the profession in colleges is the proper place to start the young pharmacist thinking in the same direction.

Otto Raubenheimer in his article "In 1825," in conclusion states: "Let me hope that this paper, although incomplete in spite of researches during 25 years, will prove of interest, and above all will arouse a little more attention to that much neglected subject, the history of pharmacy, and the history of science is a science in itself." Every page is full with a message, but the cup of hope would not be full without Dr. Fred B. Kilmer's message, "A Century of Progress, A Century of Promise."

He beautifully, and with a tremendous energy, injects "Hope." It would be a blessing to supply every pharmacist with a copy of his article. In simple delivery, he states in part: "Pharmacy is a part of the great world of science that exists for men. The art of pharmacy must be applied to the doing of real things; things of human need. The spirit of pharmacy is the spirit of service." The end of disease and death is as far away as ever. The need for the drug man will remain as long as men remain men. And so, going through this unusually talented writer's article, we find: "Pharmacy will advance and reach its full measure of joy and prosperity." And pinning his hope in the coming generation, with marked sorrow, he leaves the future of pharmacy to "Our children for their children yet unborn."

And so this remarkable number starting with the editorial by Ivor Griffith, who in his usual interesting manner describes the history of the JOURNAL, constitutes an historical document worthy of every library in the world. Every pharmacist should read this number. It will silence his scepticism, purify his commercialism and inject the hope so necessary for the mass.

SAMUEL S. DWORKIN.

"CHEMISTRY AND CIVILIZATION" (E. P. Dutton & Co.) is a review of the past, a description of the present and a forecast of the future of this important art, from the pen of Allerton S. Cushman, ex-Lieutenant Colonel of the Ordnance Department of the United States Army and Director of the Institute of Industrial Research, Inc., Washington, D. C. The fact that this is a second edition of a book published originally in 1920, speaks for its popularity and its appeal.

The book is the outcome of a series of lectures delivered by the author at the Wagner Free Institute of Science in Philadelphia, under the Richard B. Westbrook Lectureship Foundation.

From cosmic chemistry, which concerns itself with the composition and origin of the universe, to molecular structure, which deals with things so small as to be almost beyond the scope of the imagination, is a wide range to cover in a small-sized book, and much of the historical material must needs be covered in a very sketchy way. But the picture left on the mind by the book as a whole is satisfactory; and more than that the reader should not expect.

In the very first chapter the author enlists the interest of the reader by connecting up the remains of prehistoric animalculæ (limestone and cement rock) with some of the great industries of today as cement, glass, textile soap and paper.

Pen pictures of Rumford, Davy, Faraday, Liebig and Pasteur add interest and enjoyment to the chapter on Chemistry in the service of man, while the chapters on Chemistry and Industry, Chemistry and War, Chemistry and the Future are filled with valuable information presented in an entertaining manner.

The tragic story of Le Blanc, the discoverer of a method of making cheap alkali in 1787, whose works were confiscated and destroyed immediately after the execution of his friend and patron, the Duke of Orleans, in 1798, and who after spending years in a vain effort to obtain redress from the successive provisional governments committed suicide in 1806, within a twelve-month of the time that his discovery was destined to form the foundation of the glass industry in France, is only one of a series of interesting episodes related in one of the foregoing chapters.

Then, too, the book is free from technical details, or as free as one could expect. Instead of giving the outline of the manufacture of indigo in purely technical style, the author records it in Biblical fashion: "Napthalene begat Phthalic Anhydride. Phthalic anhydride begat phthalimide," etc., and we get a new viewpoint of chemical synthesis.

A philosophical point of view adds value to the chapters on some modern aspects of chemistry and modern concepts of matter and energy. The book concludes with a discussion of the modern attempts to break down the integrity of the atom. Those who have followed this phase of modern chemistry will appreciate the truth of the author's statement that "The early alchemists were considered necromancers at best, or madmen and frauds at the worst, but modern alchemy has won its way to respectability. The dreams of the ancients are fast becoming the practical facts of the moderns."

The index does not do justice to the book, as it is faulty through the greater part. It looks as though the publishers had economized on the second edition by using the index compiled for the first edition, an unpardonable blunder which will bring down maledictions from those who desire to use the book for reference purposes as well as reading.

There was a time, not so very long ago, when chemistry was just chemistry and physics was just physics. Chemists knew enough about physics to carry on certain operations and construct necessary apparatus, and physicists looked down upon chemistry as a kind of vaudeville, all right for those who wished to be entertained but unworthy the attention of a really serious-minded person. Now all this is changed. Chemistry and physics are so closely bound together that either is incomplete without the other.

While the chemists were maturing valuable industrial processes according to certain laws and theories that had been developed to meet the needs of the science the physicists were learning how to make measurements of incredible accuracy and to devise instruments of uncanny power and use.

CHARLES H. LAWALL.

THE PRINCIPLES OF PHARMACY. By Henry V. Arny, Ph. M., Ph. D., Professor of Chemistry in the College of Pharmacy, Columbia University; Member of the Committee on Revision of the U. S. Pharmacopœia. Third Edition, Revised and Entirely Reset. Octavo of 1078 pages with 289 illustrations, Philadelphia and London: W. B. Saunders Company, 1926. Cloth, $8.00 net.

The publication of Dr. Arny's textbook of pharmacy, so promptly after the issuance of the Pharmacopœia, is a distinct academic "scoop." Yet this is only typical of the virility and indomitable energy of the author. Ordinarily such a scoop carries evident earmarks of undue pressure and haste—portions are apt to "breathe hard" and to show cyanotic spots. This is not generally the case with this book. Except perhaps, that the author invites criticism by initiating his preface thus: "The appearance of the tenth revision of the United States Pharmacopœia *and of the fifth edition of the National Formulary* requires a new edition of this book," etc., when as a matter of fact the fifth edition of the National Formulary is as

yet officially unborn, and according to a recent notice its delivery is not due for several months. On that account, and because changes may yet come to pass in the text of that book, it is very obvious that N. F. material included in the Arny volume may not be totally reliable.

On the other hand the reviewer doubts that the author has recorded any important formulary information, of whose accuracy he had not been assured. Indeed the publication of parts of the N. F. text seems to have been authorized according to this paragraph printed on the fly-leaf: "Permission to use for comment parts of the text of the National Formulary, Fifth Edition, in this volume has been granted by the Committee on Publication by Authority of the Council of the American Pharmaceutical Association." Thus is the author apparently justified for his preface, and the onus of any change must rest upon the shoulders of the grantees.

The book consists of seven parts:

Part I deals with pharmaceutical processes and a striking feature is the discussion of the arithmetic of pharmacy. In this connection one regrets that no effort is made with the arithmetic of percentage solutions and proportional statements. Alligation is rather broadly treated, though not so clearly as in some of the standard textbooks on pharmaceutical arithmetic.

Part II deals with the galenical preparations of the Pharmacopœia and those unofficials worthy of notice. It will be noticed that, wherever possible, these preparations are grouped around a typical pharmacopœial recipe, thus avoiding repetition. The method of naming official and unofficial preparations is somewhat confusing. Thus: some preparations are said to be N. F. IV, others N. F. V, and often merely N. F. Camphor water is stated to be made by dissolving the camphor in alcohol, etc., when as a matter of fact the U. S. P. X. does not mention alcohol.

Part III deals with the inorganic chemicals used in pharmacy, has an introductory chapter on chemical theories, and discusses chemical arithmetic very fully. Dr. Arny is a professor of chemistry. The book reveals this fact most significantly, for much more time and effort are expended upon the chemical departments of the book than upon pharmaceutical phases. Indeed the chapters on "inorganic chemistry" and "organic chemistry" constitute almost two-thirds of the book. In justice to the author however, it should be said that these chapters, although so entitled, are not by any means

all chemical, for much therapeutic and pharmaceutic information is also included.

Part IV discusses the organic chemicals used in pharmacy, and that according to the most modern classification. Like Part III, it begins with an introductory chapter on the theory of the class of chemicals discussed.

Part V is devoted to chemical testing, and excellently summarizes the analytic methods of the Pharmacopœia.

Part VI takes up the prescription from the time it is written to the time it is dispensed. In conformity with the times, perhaps, though very unfortunately so, only forty-three pages are dedicated to the most important unit of the pharmaceutical whole—namely the prescription.

Part VII gives the laboratory work which has been followed with much success by students of the writer. A notable feature of this part is the exercise in equation writing and in chemical arithmetic that the work affords.

A peculiarity of terminology and phraseology runs through the book. Preparations are oddly written of as "officials" and "unofficials." Sentences are often incomplete. The official abbreviations by absence of the period or by its presence where not indicated, suggest hasty proofreading or careless typesetting—or both. Thus, on page 226, alone, are six separate errors. Subsequent printings will probably make corrections. Illustrations are better than in former editions, although many of the archaic half-tones could have been well replaced by simple line cuts.

On the whole, however, the printing, the assembling, the binding and the contents of the book are excellent. Its size is convenient. There is at present no textbook on Pharmacy which is so complete in its discussion of the chemistry of that vast study. Dr. Arny has the happy discursive way of treating the most intricate subject, and it is a joy to read those parts of this book concerned with subjects usually so difficult to combine effectively with young cerebral tissue, as specific gravity—the atom—valence—organic chemistry theory, etc.

In conclusion, although this work does not seem to have grasped the larger vision of pharmacy, pictured in the Charters report, it is a volume worthy of its able author, and reflecting throughout his thorough grasp of teaching principles.

IVOR GRIFFITH.